



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

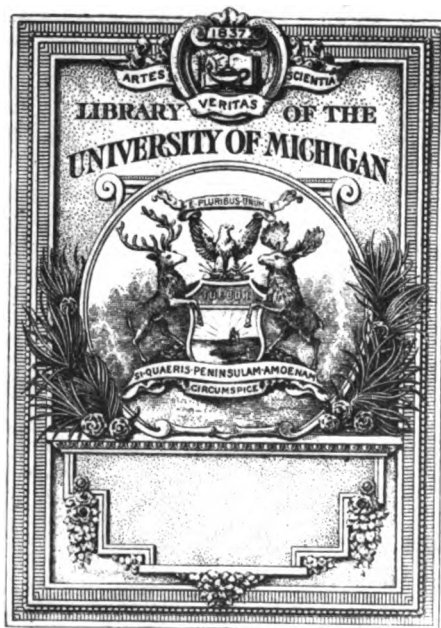
Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



B

3 9015 00208 362 7

University of Michigan - BUHR



INTERNATIONAL CLINICS

A QUARTERLY

OF
ILLUSTRATED CLINICAL LECTURES AND
ESPECIALLY PREPARED ORIGINAL ARTICLES
ON
TREATMENT, MEDICINE, SURGERY, NEUROLOGY, PEDIATRICS,
OBSTETRICS, GYNECOLOGY, ORTHOPEDICS,
PATHOLOGY, DERMATOLOGY, OPHTHALMOLOGY,
OTOLOGY, RHINOLOGY, LARYNGOLOGY,
HYGIENE, AND OTHER TOPICS OF INTEREST
TO STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION
THROUGHOUT THE WORLD

EDITED BY

A. O. J. KELLY, A.M., M.D., PHILADELPHIA, U.S.A.

WITH THE COLLABORATION OF

WM. OSLER, M.D. JOHN H. MUSSER, M.D. JAS. STEWART, M.D.
BALTIMORE PHILADELPHIA MONTREAL

J. B. MURPHY, M.D. A. MCPHEDRAN, M.D. THOS. M. ROTCH, M.D.
CHICAGO TORONTO BOSTON

JOHN G. CLARK, M.D. JAMES J. WALSH, M.D.
PHILADELPHIA NEW YORK

J. W. BALLANTYNE, M.D. JOHN HAROLD, M.D.
EDINBURGH LONDON

EDMUND LANDOLT, M.D. RICHARD KRETZ, M.D.
PARIS VIENNA

WITH REGULAR CORRESPONDENTS IN MONTREAL, LONDON, PARIS, BERLIN,
VIENNA, LEIPSIC, BRUSSELS, AND CARLSBAD

VOLUME I. FOURTEENTH SERIES, 1904

PHILADELPHIA

J. B. LIPPINCOTT COMPANY

1904

COPYRIGHT, 1904
BY
J. B. LIPPINCOTT COMPANY

PRINTED BY J. B. LIPPINCOTT COMPANY, PHILADELPHIA, U.S.A.

CONTRIBUTORS TO VOLUME I

(FOURTEENTH SERIES)

BECK, CARL, M.D., Professor of Surgery and Surgical Pathology in the Post-Graduate Medical School, and in the Medical Department of the University of Illinois (College of Physicians and Surgeons), Chicago, Illinois.

BLOODGOOD, JOSEPH C., M.D., Associate Professor of Surgery in the Johns Hopkins University, Baltimore, Maryland.

CATTELL, HENRY W., M.D., formerly Editor of the *INTERNATIONAL CLINICS*, etc., Philadelphia.

CLARK, JOHN G., M.D., Professor of Gynecology in the University of Pennsylvania, Philadelphia.

CRAIG, DANIEL H., M.D., Surgeon to Out-Patients, Free Hospital for Women, Boston; Instructor in Clinical Gynecology, Tufts College Medical School; Instructor in the Boston Polyclinic, Boston, Massachusetts.

DAVENPORT, FRANCIS H., M.D., Assistant Professor of Gynecology, Harvard University Medical School, Boston, Massachusetts.

DAVIS, NATHAN SMITH, A.M., M.D., LL.D., of Chicago, Illinois.

EDES, ROBERT T., M.D., of Boston, Massachusetts.

EDSALL, DAVID L., M.D., Associate in Medicine in the University of Pennsylvania; Associate in the William Pepper Laboratory of Clinical Medicine; Physician to the Episcopal Hospital and St. Christopher's Hospital for Children, Philadelphia.

FAVILL, HENRY BAIRD, M.D., Professor of Therapeutics in the Rush Medical College (in Affiliation with the University of Chicago), Chicago, Illinois.

GASTON, J. MCFADDEN, M.D., Genito-Urinary Surgeon to the Presbyterian Hospital, Atlanta, Georgia.

GRIFFITH, FREDERICK, M.D., Fellow of the New York Academy of Medicine, New York.

JAVAL, A., M.D., Physician to the Paris Hospitals, Paris, France.

LUTHER, JOHN W., M.D., Instructor in Gynecology in the University of Pennsylvania, Philadelphia.

MCCASKEY, GEORGE W., M.D., Professor of Clinical Medicine in the Fort Wayne College of Medicine, Fort Wayne, Indiana.

NETTER, DR., Physician to the Paris Hospitals, Paris, France.

NOBLE, CHARLES P., M.D., Surgeon-in-Chief to the Kensington Hospital for Women, Philadelphia.

PRITCHARD, WILLIAM BROADDUS, M.D., Adjunct Professor of Mental and Nervous Diseases in the New York Polyclinic and School for Graduates in Medicine; Consulting Neurologist to the Smith Infirmary, New York.

SALOMON, DR., Physician to the Paris Hospitals, Paris, France.

STEVENS, ARTHUR A., M.D., Lecturer on Physical Diagnosis in the University of Pennsylvania; Physician to the Episcopal and St. Agnes's Hospitals, Philadelphia.

WALSH, JAMES J., M.D., Lecturer on General Medicine in the New York Polyclinic, New York.

WIDAL, F., M.D., Physician to the Paris Hospitals, Paris, France.

WILCOX, REYNOLD WEBB, M.D., Professor of Medicine in the New York Post-Graduate Medical School and Hospital; Physician to St. Mark's Hospital, New York.

CONTENTS OF VOLUME I

(FOURTEENTH SERIES)

TREATMENT

	PAGE
THE CHLORID REDUCTION TREATMENT OF PARENCHYMATOUS NEPHRITIS. By F. WIDAL, M.D., and A. JAVAL, M.D.....	1
ADONIDIN: A CLINICAL STUDY. By REYNOLD WEBB WILCOX, M.D...	13
THE THERAPEUTIC APPLICATIONS OF COLLOID SILVER. By Drs. NETTER and SALOMON.....	18
WHAT IS THE CURE FOR NEURASTHENIA? By ROBERT T. EDES, M.D.	26
THE TREATMENT OF GASTRIC NEURASTHENIA AND ALLIED CON- DITIONS. By GEORGE W. McCASKEY, M.D.....	34

MEDICINE

THE INCREASED PREVALENCE AND MORTALITY OF PNEUMONIA DURING THE LAST SIXTY YEARS, WITH REFERENCE TO ITS PREVENTION AND TREATMENT. By NATHAN SMITH DAVIS, A.M., M.D., LL.D.....	41
THE PRACTICAL APPLICATION OF CRYOSCOPY TO MEDICINE. By HENRY W. CATTELL, M.D.....	50
NEPHRITIS OF GASTRO-INTESTINAL ORIGIN. By HENRY BAIRD FAVILL, M.D.	65
THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS. By JAMES J. WALSH, M.D.....	75

SURGERY

ANGIOMA AND ITS TREATMENT. By CARL BECK, M.D.....	88
A CRITICAL REVIEW OF METHODS OF INTESTINAL ANASTOMO- SIS, WITH ESPECIAL REFERENCE TO THE CONNELL SUTURE. A REPORT OF FIVE CASES. By JOHN G. CLARK, M.D., and JOHN W. LUTHER, M.D.....	98

v

	PAGE
COMPLICATIONS MET IN THE SURGICAL TREATMENT OF DISEASES OF THE TESTICLE. By J. McFADDEN GASTON, M.D.....	116
OBSERVATIONS UPON GASTRIC, INTESTINAL, AND LIVER SURGERY IN THE GERMAN CLINICS. By CHARLES P. NOBLE, M.D...	123
A NEW SURGICAL Mallet. By FREDERICK GRIFFITH.....	136

GYNECOLOGY

THE NON-OPERATIVE TREATMENT OF INFLAMMATIONS OF THE GENITAL TRACT. By FRANCIS H. DAVENPORT, M.D.....	141
THE NON-OPERATIVE TREATMENT OF CHRONIC OVARIAN LESIONS. By DANIEL H. CRAIG, M.D.....	153

NEUROLOGY

PERIPHERAL NEURITIS. By WILLIAM BROADDUS PRITCHARD, M.D....	166
---	-----

PROGRESS OF MEDICINE DURING 1903

MEDICINE. By DAVID L. EDSALL, M.D.....	182
INFECTIOUS DISEASES.....	182
Tuberculosis	182
Typhoid Fever.....	187
Paratyphoid Fever.....	189
Pneumonia	190
Pneumococcus Septicemia.....	190
Rheumatism	191
Variola	192
Malaria	192
Miscellaneous Infectious Conditions.....	194
PARASITIC DISEASES.....	195
DISEASES OF METABOLISM	196
DISEASES OF THE BLOOD	201
DISEASES OF THE CARDIOVASCULAR SYSTEM.....	204
DISEASES OF THE RESPIRATORY SYSTEM.....	208
DISEASES OF THE GASTROINTESTINAL TRACT.....	210
DISEASES OF THE LIVER	215
DISEASES OF THE KIDNEY	217

CONTENTS OF VOLUME I

vii

	PAGE
SURGERY. By JOSEPH C. BLOODGOOD, M.D.	223
SHOCK, COLLAPSE, AND BLOOD-PRESSURE.....	226
SURGICAL INFECTIONS.....	227
ANESTHESIA	228
BLOOD EXAMINATIONS.....	230
BLOOD CULTURES.....	231
BURNS AND SCALDS.....	232
FRACTURES	233
TUMORS	234
SURGERY OF THE STOMACH	243
SURGERY OF THE PANCREAS	257
TREATMENT. By A. A. STEVENS, M.D.	266
INFECTIONOUS DISEASES.....	266
Typhoid Fever.....	266
Scarlet Fever.....	269
Diphtheria	269
Smallpox	270
Erysipelas	271
Pneumonia	272
Whooping-Cough	272
Malaria	274
Tetanus	274
Plague	275
Tuberculosis	276
Rheumatism	279
CONSTITUTIONAL DISEASES.....	280
DISEASES OF THE BLOOD	282
DISEASES OF THE DUCTLESS GLANDS.....	283
DISEASES OF THE CIRCULATORY SYSTEM.....	284
DISEASES OF THE KIDNEY	288
DISEASES OF THE RESPIRATORY TRACT.....	291
DISEASES OF THE STOMACH AND INTESTINE.....	292
DISEASES OF THE LIVER	296

LIST OF ILLUSTRATIONS TO VOLUME I

(FOURTEENTH SERIES)

COLORED PLATES

	PAGE
Symmetrical capillary angioma, front view (Fig. 1).....	90
Symmetrical capillary angioma, rear view (Fig. 2).....	90
Arterial angioma of the penis, scrotum, and perineum, after operation (Fig. 6).....	96

PLATES

Venous angioma of the face and neck, before operation (Fig. 3).....	94
Venous angioma of the face and neck, after operation (Fig. 4).....	94
Arterial angioma of the penis, scrotum, and perineum, before operation (Fig. 5).....	95
Result of a plastic operation in the foregoing case of arterial angioma of the penis, scrotum, and perineum (Fig. 7).....	96
Venous angioma of the tongue (Fig. 8).....	96
Arterial angioma of the temporal region, eyelid, and ear, before operation (Fig. 9).....	96
Arterial angioma of the temporal region, eyelid, and ear, after operation (Fig. 10).....	97
Carcinoma of the sigmoid flexure (Fig. 1).....	102
Carcinoma of the cecum (Fig. 2).....	102
Carcinoma of the anterior wall of the stomach with perforation (Fig. 3) ..	102
Illustrating gastroduodenostomy (Fig. 4).....	103
Showing the result of an operation for the cure of hernia and removal of a large mass of omentum and the testicle (Fig. 1).....	118
The testicle and portion of omentum removed (Fig. 2).....	118
The Bassini-Halsted method of the radical cure of hernia (Figs. 3, 4, 5, 6, 7, 8, and 9).....	122
Dressings used in the non-operative treatment of chronic ovarian diseases (Fig. 1).....	159
Showing the use of the bivalve speculum with the patient in the Sim's posi- tion (Fig. 2).....	162
Congenital pigmented, apparently benign, mole of the axilla (Fig. 1)....	238
Congenital pigmented mole of the arm with axillary metastasis (Fig. 2) ..	238
Pigmented lymphangiosarcoma of the pectoral region (Fig. 3).....	238
Congenital pigmented mole of the face (Fig. 4).....	238
Congenital mole of the scalp (Fig. 5).....	238
Congenital hairy, pigmented mole of the face (Fig. 6).....	238

	PAGE
Congenital pigmented mole of the back (Fig. 7).....	239
Congenital pigmented mole (Fig. 8).....	239
Congenital hemangioma in a child (Fig. 9).....	240
Fibrohemiangioma (elephantoid hemangioma) of the palmar surface of the thumb (Fig. 10)	240
Fibrohemiangioma of the skin near the ankle (Figs. 11 and 12).....	240
Congenital pigmented naevi (Figs. 13, 14, and 15).....	240
Recurrent cicatricial keloid (Fig. 16).....	241
Fibrosarcoma of the abdominal wall with internal metastasis (Fig. 17)...	241
Pedunculated lipoma with elephantiasis of the skin (Figs. 18 and 19)	242
Carcinoma basocellulare, Krompecher (Figs. 20, 21, and 22).....	243
Areas of pain in perforation of gastric ulcer (Fig. 23).....	250
Areas of tenderness in perforation of gastric ulcer (Fig. 24).....	250
Areas of pain in perforation of duodenal ulcer (Fig. 25).....	251
Areas of tenderness in perforation of duodenal ulcer (Fig. 26).....	251
Finney's method of gastroduodenostomy (Figs. 27, 28, 29, 30, 31, and 32) ..	254
Watt's case of peptic ulcer after gastroduodenostomy (Fig. 33).....	255
Lines of incision practised by different surgeons in the removal of cancer of the stomach (Fig. 34).....	256
The completion of Mayo's operation for cancer of the stomach (Fig. 35) ..	256
The position and number of lymphatic glands that may be involved in metastasis from gastric carcinoma, anterior view (Fig. 36), posterior view (Fig. 37).....	256
The abdominal findings in two cases of pancreatic abscess (Figs. 38 and 39)	264

FIGURES

Sphygmographic tracings illustrating the action of adonidin.....	15, 16, 17
Cryoscopic apparatus (Fig. 1).....	53
Schematic drawing representing the principles involved in the Halsted quadrangular suture (Figs. 5 and 6).....	107
Schematic representation of the Connell suture (Figs. 7 and 8).....	113
The force-projection following a true blow with an iron- or a steel-headed hammer (Fig. 1).....	136
The force-projection following a false blow with an iron- or a steel-headed hammer (Fig. 2).....	137
The vibrations in a leaden mallet (Fig. 3).....	139
Griffith's new mallet made of beech-wood (Fig. 4).....	138
The vibration projection in an ordinary carpenter's mallet (Fig. 5).....	139
The unimpeded vibration projection in Griffith's new mallet (Fig. 6).....	140

Treatment

THE CHLORID REDUCTION TREATMENT OF PARENCHYMATOUS NEPHRITIS

BY F. WIDAL, M.D., AND A. JAVAL, M.D.

Physicians to the Paris Hospitals

THE action of sodium chlorid in the production of edema in the course of nephritis with especial involvement of the epithelium was demonstrated beyond question by the cases which one of us recently published in collaboration with M. Lemierre. Thus, with four arteriosclerotic patients suffering from interstitial nephritis the daily absorption of 10 grams of sodium chlorid was found to produce neither edema nor any other disorder, whereas with two patients out of three suffering from parenchymatous nephritis this dose gave rise to extensive edema.

This action of sodium chlorid, as we remarked at the time, raised a number of very interesting problems for daily practice, and we have attempted to elucidate some of them in another case of parenchymatous nephritis in which we have examined daily the chlorid exchanges during 72 days.

During this long period we suddenly changed the amount of chlorids in the diet on nine occasions. In this way we produced alternately five times a discharge of chlorids and four times their retention, and we succeeded with remarkable precision in realizing at will either the hydration or the dehydration of the system, and according to the degree to which we pushed this hydration we were able to produce either simple increase in weight or else edema.

The retention of chlorids in thus producing hydration and edema does more than afford us the spectacle of both a clinical and physiologic curiosity, since it gives rise to profound perturbations in metabolism. The study of our patient will show us, in particular, that the degree of albuminuria, a leading symptom in the course of nephritis, follows the oscillations of the chlorid retention curve.

We shall see that salt is the dangerous food-stuff in certain cases of parenchymatous nephritis, and a chlorid reduction cure is what must be insisted on in their diet at certain times. The favorable effect of milk is due largely to its relative poverty in chlorids, and we shall see that food-stuffs hitherto considered harmful may be partially given in its place, or even replace it with advantage, on condition that sodium chlorid be not added to their composition. There are in this connection some principles of diet which it is important to emphasize.

The patient on whom this study was carried out is a man of 62 years, exposed to the action of cold through his work as a well-digger. In his antecedents we only find an attack of typhoid fever, in 1878, a dyspeptic condition that began in 1890 and lasted three years, and a pulmonary form of influenza, in 1895. In July, 1902, he was seized with a dysenteric form of diarrhea that caused as many as 15 evacuations a day, lasted a week, and left him very much prostrated. It was after a few days of convalescence that he noticed for the first time some facial edema localized particularly to the eyelids. Still, he continued for two months longer his heavy work as a well-digger, though the edema of the face did not disappear.

On October 26 he noticed for the first time an enormous degree of edema of the left leg brought on by a superficial wound. In November, 1902, the edema of the legs reached the thighs and scrotum. At that period the albuminuria oscillated between 1.50 and 3 grams a day, and the patient entered the hospital, which he left again on December 15.

He had no sooner got around again than the edema reappeared in the legs and scrotum, and on January 15, 1903, the patient entered our wards infiltrated and with a marked degree of albuminuria; there was no trouble in breathing nor in his sight, arterial pressure was 20, and a slight galloping rhythm was perceived at the heart. The methylene blue test, carried out on January 23, showed that the blue passed into the urine from the second to the fifty-second hour. The patient remained in our wards until the end of March, without any manifest change in his condition, but one point was very striking in his case: each time that he gave up his milk diet and took the ordinary food of the hospital the edema appeared rapidly, and each time that he went back to his milk the edema disappeared equally quickly.

Every patient suffering from parenchymatous nephritis does not present during the evolution of his disease an unvarying susceptibility to diet. The complaint often proceeds in spells, between which the influence of diet is less noticeable. It was, therefore, on account of the fact that this man was certain to react, and to an unusual degree, to the slightest change in diet that we chose him from among all the patients of our wards as a subject for this study. It was to be expected that he would turn out a model subject for the tests that we proposed to institute, and the results showed that we were not mistaken.

In order to study in our patient the influence of chlorids we put him, beginning with March 31, at one time on a milk diet, and at others on diets composed of very simple but varied food, always carefully weighed. We took care always to compose these diets in such a way that they should be about equally rich in albuminoids and both isohydric and isothermic, that is to say, containing the same amount of water and supplying the system with the same number of calories.

By this means we were able to show that variation of organic hydration carried up to the point of edema had nothing to do with the amount of water absorbed, and that the widely differing degrees of albuminuria that we created had no connection with the amount of albuminoids supplied by the different diets, which was always about the same.

Each day we estimated the amount of chlorid contained in the food given, and we added it to the amount of chlorid taken in substance during the periods in which the patient was put to the test of alimentary chlorids in excess. To establish the balance in the exchange of chlorids and water, we analyzed the urine every day. We always took into account the water contained in the feces, but we did not measure the chlorids they might contain except when there was diarrhea. As a usual thing the feces only contain traces of chlorid, about 10 to 20 centigrams; the error on this account, therefore, is very slight. In cases of diarrhea, on the other hand, we have seen the feces contain as much as 4.64 grams of sodium chlorid,—that is, more than the urine of that day contained.

In this way we had all the elements to study the relations between the different diets upon which the patient was put, as well as his variation in weight, hydration, edema, albuminuria, and chlorids. At the moment when we began this study the patient, under the

influence of the ordinary diet of the hospital, was distended with edema, and his albuminuria varied between 10 and 15 grams in 24 hours.

We began our first test period by putting him for 10 days on an absolute milk diet of $3\frac{1}{2}$ liters daily. As the chlorides were the element of which it was essential that we should know the amount taken, we made a number of different analyses of hospital milk which gave us 1.5 grams of chlorids per liter or 5.50 grams for $3\frac{1}{2}$ liters. We estimated in sodium chlorid the total amount of chlorin of the milk chlorids.

This milk diet, followed from March 31 to April 9, put an end to the edema rapidly, and produced equally rapid dehydration of the tissues, since the patient lost 5700 grams in weight during that period. That this loss in water occurred for the most part by means of diuresis was shown by the polyuria.

During this period of 10 days the average quantity of chlorids eliminated in the urine was 8.80 grams a day. Deducting the amount of chlorids absorbed, 5.50 grams, we found that the loss of chlorids to the system was about 3.30 a day, or 33 grams for the ten days. At the same time that this loss in water and chlorids took place we noticed an extremely regular and rapid decrease in the albuminuria, which from 15 grams went down to 3.38 grams.

Our second test period, which extended from April 10 to April 18, was the counter-proof to the first. We still kept our patient on the same milk diet, letting him take every day, besides, 10 grams of sodium chlorid by the mouth. The sodium chlorid, chemically pure and in powder, was given to him in wafers of 2 grams each every hour, beginning with the hour fixed on for the commencement of the test. By giving it to him in the early part of the day we placed ourselves in the most favorable conditions to obtain from the first day the maximum of excretion.

The result of this addition of sodium chlorid to the milk diet was that during this period of eight days the patient gained 2100 grams in weight, and this increase was solely due to retention of water, as was proved by the difference in the urinary secretion, which fell from an average of 2550 c.c. a day during the first period, to 1900 c.c. in the second. The chlorids were retained in the system at the rate of 4.57 grams a day, or 36 grams for the eight days. At

the same time we noted an attack of albuminuria, since the albumin rose very rapidly from 2.06 grams to 12.12 grams.

Our first two tests of giving and suppressing chlorids having been made by means of a milk diet, it seemed interesting to repeat the experiment without the help of this diet.

Our third test period lasted eleven days, from April 18 to 29. Suddenly, and at the height of the albuminuria, we replaced the salted milk diet by the following: 400 grams of raw meat, 1000 grams of potatoes, 100 grams of sugar, 80 grams of butter, and 2500 grams of an aromatic infusion. We estimated that this diet was isothermic with the preceding milk diet, that it contained about the same quantity of water and albuminoids, and that its tenor in chlorids did not exceed 1.50 grams.

It will be granted that this was not a diet supposed to be beneficial for a patient whose urine contained 12 grams of albumin; and yet during this period of eleven days we noted rapid and progressive dehydration of the system, a loss of weight of 3700 grams, and a drop in the albuminuria from 12 grams to 0.72 grams. The loss of chlorids was 3.23 grams a day or 35.50 grams for the eleven days.

This is the surprising result that can be obtained by a meat diet lacking in chlorids, and the following test will show that it was indeed the absence of chlorids that produced the result.

During the fourth test period, which lasted a week from April 25 to May 5, it was sufficient to add sodium chlorid to the preceding diet, at the rate of 10 grams for three days and of 15 grams for 4 days, to see the patient's weight increase by 2900 grams and the albuminuria rise from 1 gram to 2.04 grams a day. During this time the system retained an average of 7.04 grams of sodium chlorid a day, or 49.28 grams for the whole period.

Here again it was the addition of sodium chlorid to the meat and potato diet that gave rise to the retention of chlorids, hydration, and albuminuria.

During a fifth period, from May 5 to 9, we placed our patient for four days on an absolute milk diet, with the same quantity as before of $3\frac{1}{2}$ liters. During this short space of time the patient became partially dehydrated and lost 1600 grams in weight. The albuminuria, which was slight, did not change, but varied between 2.35 and 2.16 grams a day. The daily loss in chlorids was only 1.89 grams, or a total amount of 7.56 grams for the four days.

At this stage the patient became tired of all these diets, and feeling well and thinking that he was cured, asked to leave the hospital to resume his work on an ordinary mixed diet. Forced to yield to his wishes, he was given the ordinary hospital diet for six days. The result showed itself immediately, and during this sixth period the patient's weight increased at the unusual rate of 1083 grams a day. In this way the hydration reached a point that we had not yet observed, 8700 grams for the period; edema began to appear at the fifth day of this acute hydration and the albuminuria rose steadily from 2.12 to 11.50 grams.

As it was impossible to measure the chlorids of this mixed diet, we did not make a daily estimate of urinary chlorids; but it is well known that the ordinary hospital diet is very rich in salt.

We had then to account for this acute and massive hydration which produced edema so rapidly and increased the patient's weight in such enormous proportions. There can be no doubt that the reason is to be found in the fact that this new diet took the patient's system by surprise when he had not yet eliminated a sufficient quantity of chlorids. We have only to remember that during the preceding test period the patient had only lost 7.56 grams of sodium chlorid, whereas in the one that preceded, the fourth, he had stored up 49 grams. He was, therefore, practically in a condition of chlorid salivation at the time when the sixth diet, containing an unknown amount of salt, was begun. Rapid appearance of edema under such conditions was to have been foreseen.

The effect of giving or withholding chlorids on the degree of our patient's hydration might appear to have been already fully demonstrated, but in order to render the experiment quite irrefutable and to emphasize the unquestionable action of salt, we had still to cause the edema to disappear by means of a meat diet without salt and to make it reappear with a salted milk diet.

From May 16 to 19, therefore, during four days, we instituted a seventh test period. As in that of the third period the diet was composed of meat, 400 grams; potatoes, 1000 grams; sugar, 100 grams, and butter, 80 grams. The patient insisted on having one liter of infusion replaced by a $\frac{1}{2}$ liter of milk, and owing to the later addition the diet contained about 2.35 grams of chlorids or 85 centigrams more than the diet of the third period.

Under the influence of this meat diet without chlorids the patient

lost 5000 grams in weight in four days; the extensive edema of the first day only appeared a little bit in the evening of the fourth, and that in spite of the fact that the patient had been up and about the entire day. The loss in chlorids during this period was 36 grams and the albuminuria had fallen from 11.50 to 6.37 grams. It should also be noted that the polyuria had been intense, and that the albuminuria had fallen from 5.75 to 1.80 grams per liter.

The edema having thus been reduced to a minimum, we put the patient back on the milk diet of $3\frac{1}{2}$ liters a day, and in addition gave him 15 grams of sodium chlorid, which made a total of 20.50 grams of chlorids taken each day. This, the eighth period, lasted from May 21 to 25.

During these four days of salted milk diet the weight increased 2500 grams and the amount of salt retained was 44 grams. The study of the albuminuria on this occasion showed us something new. From 5.67 grams it rose on the second day to 9 grams, on the third to 9.25 grams, while on the fourth it fell to 5.32 grams.

On May 22 and 23, the second and third days of the diet, the edema reached the upper part of the thighs and the scrotum, though this did not inconvenience the patient at all; but on the 24th it had still farther increased and the patient complained of severe headache, total loss of appetite, tingling in the legs, and such prostration that he said he was quite unable to get up. In the presence of such symptoms we decided that the limit of tolerance for the edema had been reached, and that it would be necessary for the patient to eliminate his chlorid as quickly as possible. We, therefore, put him on a water diet for one day and then on meat and bread without salt.

During this ninth and final test we made further variations in the unsalted diet and replaced the 1000 grams of potatoes by 500 of unsalted bread, which we had had specially made by getting the baker to cook it separately without any salt; although a little insipid the bread, thus prepared, was perfectly eatable.

In order to make this diet isothermic and isohydric with the preceding ones it was composed as follows: Bread, 500 grams; raw meat, 400 grams; sugar, 100 grams; butter, 80 grams; infusion, 2500 grams. This diet contained 113 grams of albuminoids. The amount of chlorids contained normally in the meat, butter, and flour might be estimated to vary between 1 and 2 grams.

Under the influence of this diet the patient lost 7000 grams in

weight in 18 days. Already on the third day he weighed only 62,100 grams, and the edema had entirely disappeared.

During the first ten days of the test the albuminuria remained practically at the point at which it had been at the close of the preceding test, but during the final 8 days, when the edema had disappeared, it began gradually to descend to reach 0.75 grams on the last day.

The test of the permeability to methylene blue, carried out again at this time, showed that elimination took place very regularly from the second to the seventy-second hour.

Since June 12, when we stopped making a daily analysis of our patient's urine, we have left him on the meat diet of our ninth test period. This diet has been perfectly tolerated; on June 19, after 25 days of this diet, his weight was about 58 kilos (128 pounds). His general health continued to be very good, the elimination of sodium chlorid was 1.50 grams and the albuminuria about 0.20 a liter or 0.50 a day.

By prolonging this diet for such a long time we wished to see to what point the tolerance of certain patients for a diet containing so little salt might go. In general practice such a diet need no doubt only be used for a more limited space of time and need hardly ever be prescribed in so rigorous a manner. The facts mentioned above show that even during the most serious periods of nephritis, the milk diet may be mitigated by a variety of articles of food. We must not, however, lose sight of the fact that, although we know what accidents can be produced by chlorid retention, we do not yet know the possible harm that may arise from prolonged chlorid deprivation.

In varying nine different times with our patient the amount of chlorids in his diet we, therefore, produced chlorid retention four times and chlorid elimination five times. In order to study the mechanism of chlorid retention and elimination with the desired precision, we always took great care to pass from one extreme to the other in the chlorid contents of our diets.

The tissue hydration and dehydration were found each time to follow mathematically the giving or withholding of chlorids.

Four times we noted chlorid retention and four times we simultaneously observed an increase in weight through hydration. Twice we were able to carry this hydration to the point of edema. On five

occasions we withheld all chlorids, and each time noted a parallel loss of weight through dehydration.

This case shows how insufficient the analysis of urine is in judging the action of chlorids, if it is not accompanied by an equally rigorous dosage of the alimentary chlorids. We cannot dwell too strongly on this point, that the amount of chlorids excreted gives no indication whatever by itself; everything depends on its relation to the chlorids absorbed. Thus, we saw that our patient was very well some days with an elimination of 1 gram of sodium chlorid by the urine, whereas he was quite ill at other times with the daily elimination of 10 grams.

Our patient's weight oscillated during these tests between the extremes of 56 and 66 kilos (123 and 145 pounds). When, during an ascent under the influence of chlorid administration, his weight began to exceed 62 kilos, edema appeared; conversely, when under the influence of chlorid deprivation his weight in its descent reached a point about 1 kilo below this figure of 62 kilos, edema disappeared. In the case of our patient, therefore, the tolerance of his system for hydration without edema was 62 kilos.

The scales enabled us, therefore, to foresee almost to a day the appearance of edema by supplying us with the means of following day by day the increase in weight during all the period of hydration that might be called that of pre-edema.

The curve of the albuminuria during our tests showed a most interesting evolution. Each time it varied in the same sense as the hydration and chlorid storage of the tissues, rising or descending with them and in considerable proportions. Whereas the curves of hydration and chlorid storage follow each other exactly, the curve of albuminuria sometimes falls behind the two others and also shows slight variations.

This relation between the degree of albuminuria and that of hydration and of chlorid retention is one of the most interesting facts of our case. In the two instances in which M. Lemierre and I produced edema, in one we noted this same parallelism between the curves of the albuminuria and hydration; in the other one we did not notice it.

Although our tests show that this patient presented renal impermeability to sodium chlorid, they also show how difficult it is to settle its degree. For this impermeability depends on factors with

which we are not acquainted, and among others on the amount of chlorid absorbed and on the constantly varying amount of chlorids contained in our tissues. Thus we noted this paradoxical point that with an absorption of 15.50 grams of chlorids the excretion never exceeded 12 grams, whereas with 20.50 grams absorbed, the excretion fell to between 9 and 10 grams. It was when the patient was taking the very small quantity of 2.35 grams of chlorids that we observed the greatest elimination of this salt, namely, 12.60 grams. In one of the cases reported with M. Lemierre we had already noticed that the amount of chlorids eliminated decreased during the test of adding salt to the food. We are, therefore, far from being certain of increasing the excretion of salt by raising the amount absorbed beyond a certain amount.

In spite of the defective elimination of salt by our patient, that of methylene blue was almost normal in his case, and we had already noticed a similar occurrence in conjunction with M. Lemierre.

The chlorid balance is much too delicate a matter to strike to warrant our hoping that in practice we shall be able to derive from the alimentary increased chlorid test, compared with the chemical analysis of urine, individual indications based on the degree of retention of this salt.

The diminution of edema when it exists, as well as decrease in weight if the patient is not in a condition of apparent hydration, will often enable us to decide whether we are acting wisely in decreasing the chlorids of the diet. Scales can furnish us with the most valuable information.

Salt is no doubt not the only substance capable of bringing on edema or albuminuria. Different substances or poisons contained in the food which we absorb each day have a very probable action in the production of these symptoms. In our case the period in which hydration and edema increased most rapidly was precisely that in which the patient was eating the ordinary hospital food.

As we mentioned above, we chose this patient for our tests because, before systematically increasing the chlorids in his food, we had noticed that each mistake in diet produced in him both edema and albuminuria.

During all the periods of a case of parenchymatous nephritis salt has probably not the same effect. During the periods of quiet, in which certain patients are able to return to an ordinary diet without harm, salt would no doubt have less effect. It is at the moments of

the disease when, for reasons that we do not always perceive, acute phases occur, that salt becomes such an important substance. Salt has, therefore, on the pathogenesis of certain forms of nephritic edema an action that we can no longer ignore.

Since the beginning of his nephritis our patient could never take solid food without the appearance of edema and his albuminuria increasing. A few days of milk diet would then cause his edema to disappear and his albuminuria to diminish. Now with this man we were able, in spite of a milk diet, to produce a crisis of edema and albuminuria; while with a diet of dark meat, 400 grams, bread, 500 grams, and potatoes, 1000 grams, we were able to cause the edema to disappear and the albuminuria to decrease at will.

What did we need to produce such opposite results? Simply to vary the amount of salt in these diets. Ten grams of salt taken daily with the milk were enough to make it a most harmful diet, whereas the suppression of salt in the meat diet made it such a favorable one that the period during which the patient was following it was the one in which the albuminuria curve touched its lowest point. We feel that it is impossible to demand a closer experimental proof than this one.

The point had long been raised as to why the albuminoids of animal origin, such as those of milk, were less harmful than those of meat. Our experiments show that for the kidneys in certain cases of parenchymatous nephritis both of these albuminoids are harmless. It is not the albumin in the meat diet that is harmful, but the salt that is added to it.

Almost every one who has written on kidney disorders admits that meat must not be excluded from the patient's diet during the torpid periods of chronic Bright's disease, but they are equally unanimous as to the undesirability of meat and solid food during acute nephritis or during the acute phases of chronic nephritis. But our patient shows precisely the unexpected spectacle of an acute attack of parenchymatous nephritis in which the anasarca disappeared and the albuminuria decreased on a most substantial meat diet but containing no salt.

Milk, therefore, whose salutary action on nephritis has been known so long, derives a large part of its qualities from its low tenor in salt. The $3\frac{1}{2}$ liters of milk, corresponding to the 2432 calories sufficient to nourish the patient, only contained about $5\frac{1}{2}$ grams of

salt. This was a very small amount of salt, since the average quantity necessary for a man is usually over 10 grams.

Many physicians have always believed that spices and salted food were not harmless in all cases of Bright's disease. We have now shown how salt, alone and in the most sudden manner, may be the cause of recurrences of edema and increase in albuminuria.

Milk, in spite of the relatively low amount of salt it contains, may still be too rich in this substance for a case of parenchymatous nephritis with chlorid retention. By suppressing the 40 or 60 grams of salt that cattle-raisers generally add to a cow's daily food, it may be possible to obtain a milk less rich still in salt and more adapted to these cases of Bright's disease.

Finally, every one knows how difficult it is in practice to get certain patients to follow an absolute milk diet for any length of time, either because they dislike it or because it disagrees with them.

We shall, therefore, now be able, when circumstances or the patient's tastes require it, to substitute for a diet poor in chlorids such as milk diet, a diet containing less chlorid still, but composed of a variety of food, some rich in albuminoids such as meat, others in carbohydrates such as bread, sugar, or potatoes, and others in fat such as butter. Rice, pastry, or alimentary pastes will give similar results, provided they are made without salt. For all of these food-stuffs contain only traces of salt in their natural composition. Meat, for instance, contains it in the proportion of about one per thousand, and bread only contains the very small amount coming from the flour, when it is not salted by the baker.

The study that we have now completed of the pathologic physiology of edema, hydration, and albuminuria during epithelial nephritis confirms and strengthens the points observed in collaboration with M. Lemierre, and leads us to the conclusion that the best treatment for certain periods of the disorder is to lessen for a certain time the absorption of chlorids. Milk, which for a long time had empirically been found to be so useful, acts largely by its lack of salt. We have shown that a diet can be found containing less chlorids still than milk. The nature of a food is less important than its tenor in salt. By means of experimental proofs taken from clinical observation we have shown that a variety of forms of solid food, taken by themselves or combined with milk, may, provided no salt is added to them, become for a certain length of time an excellent means of help in a treatment by chlorid diminution.

ADONIDIN: A CLINICAL STUDY

BY REYNOLD WEBB WILCOX, M.D., LL.D.

Professor of Medicine at the New York Post-Graduate Medical School and Hospital; Physician to Saint Mark's Hospital, New York

ADONIDIN is a glucoside, first isolated by Cervello, in 1882, from the false hellebore (*Adonis vernalis*; natural order, *Ranunculaceæ*) which grows in Northern Europe and Asia. It occurs as a hygroscopic, canary-colored powder, of an intensely bitter taste. It is soluble in water and alcohol, but not in ether, chloroform, or benzin. It contains no nitrogen. The dose is $\frac{1}{4}$ to $\frac{1}{2}$ grain (0.01 to 0.02 gram), two or three times daily.

Adonis vernalis has long been known in Russia, where Botkin and Burnow have employed it in the treatment of cardiac and renal diseases. Altmann, in 1884, and Huchard, in the following year, recommended it as a heart regulator,—using this term in the same sense as for *digitalis*. Leyden was of the same opinion, but pointed out the fact that it caused nausea, vomiting, and diarrhea. Bubnow, in 1879, demonstrated in his laboratory experiments that *adonis* possesses the same action on the heart and blood-pressure as does *digitalis*. Hare showed that toxic doses caused an arrest of the heart in diastole (frogs). Lublinski reported that it showed a distinct diuretic action, increasing both the urinary water and the solids. Cantani found that in pleurites its diuretic action produced favorable results as regards the effusion, and that the inflammation was lessened. And finally, it was the belief of Durand, in 1885, that it was not cumulative.

The action of adonidin is as follows: (1) Heart: after a moderate dose there is acceleration, but later it decreases the pulse-rate, therefore lengthening the diastole, owing to its stimulation of the inhibitory nerves. (2) Arteries: there is a marked primary rise of blood-pressure of cardiac origin which is maintained by arterial contraction plus increased force of cardiac contraction with

a late fall from vasomotor paralysis. (3) Kidneys: diuresis because of improved circulatory conditions.

The uses of adonidin are largely in cardiac diseases in which a rapid pulse of low tension is a notable feature. Its qualities, prompt and energetic action, with permanence of effects without cumulation, determine a sphere of usefulness which warrants consideration. For instance, it may be employed to begin a course of treatment which is to be continued with *strophanthus* or *digitalis*. It may be an excellent substitute for *digitalis* when there is idiosyncrasy. In fevers, when *digitalis* is ineffective, this remedy may be indicated. Its action upon the heart is more permanent than that of drugs of its class, so that less frequent doses are required. It is less a vaso-constrictor than *digitalis*, although probably slightly more than is *strophanthus*.

Naturally, all cardiac drugs, in their therapeutic uses, rest upon a consideration of the conditions, (1) of the myocardium, (2) of the arteries, and (3) of the valves. Therefore, it is improper to state that a remedy is useful in mitral insufficiency, for instance, unless the size of the arteries and the condition of their walls is taken into account and the capacity of the heart muscle to respond to the drug is ascertained. With this restriction, the conditions for which adonidin may be administered are: Mitral and aortic insufficiency, dilatation, arrhythmia, precordial pain, and the symptom-complex, known as tobacco heart. In fatty degeneration, pericarditis, simple and compensatory hypertrophy, and in certain atheromatous conditions, notwithstanding its most prompt and energetic action, it may be safely administered when *digitalis*, if given at all, must be used with great caution. Other conditions in which it has been useful are asthmatic paroxysms, certain instances of nephritis, and in febrile disturbances in which a heart stimulant is required. As compared with *digitalis*, it is more rapid, powerful, certain, and curative (Bartholow). It is not so reliable for prolonged administration because it is more irritating to the alimentary tract. On account of this same property it cannot be administered hypodermatically.

In the following instances of the use of adonidin I have endeavored to show its value by sphygmographic tracings.

CASE I.—Mrs. B. A., aged 60 years. June 3. Palpitation,

vertigo, headache, fainting. Diagnosis: Mitral regurgitation, fibromyocarditis, aortic obstruction.



June 10. Some improvement in headache and other nervous symptoms.



July 3. Has but little palpitation since last report. Pulse more regular; cardiac first sound more prolonged and louder.



CASE II.—Mrs. E. J., aged 67 years. April 11. Dizziness, general weakness, persistent headaches, occasional nausea. Aortic second sound accentuated. Urine: specific gravity 1007, urea 1.03 per cent., a few hyaline casts. Diagnosis: chronic arterial (interstitial) nephritis, hypertrophy of left ventricle.



April 15. Feels stronger, no nausea, less dizziness. Urine: specific gravity 1011, urea 1.21 per cent.



May 2. No headache. Urine: specific gravity 1014, urea 1.29 per cent., still hyaline casts. Feels much better.



CASE III.—D. M., aged 47 years, a merchant. November 15. For many years dyspnea and palpitation on exertion, edema of the feet. Urine: amount 1250 c.c., specific gravity 1021, a trace of

albumin, a few epithelial casts. Diagnosis: mitral obstruction (slight) with marked regurgitation, some ventricular dilatation.



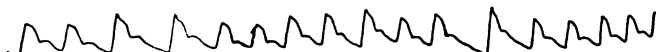
November 17. Less edema of feet. Urine: amount 1720 c.c., specific gravity 1018, no albumin, less ventricular dilatation.



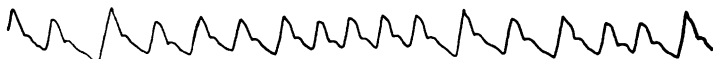
CASE IV.—W. J., aged 37 years, a broker. March 11. For past two weeks dyspnea, precordial pain, and palpitation on exertion; has lost much flesh in past two months. Diagnosis: slight aortic regurgitation, marked mitral obstruction and regurgitation; considerable ventricular dilatation. Urine: amount 1120 c.c., specific gravity 1019, a trace of albumin, a few epithelial casts, urea 0.65 per cent.



March 16. Symptoms relieved. Urine: amount 1710 c.c., specific gravity 1017, no albumin, no casts, urea 1.05 per cent.



March 23. Patient comfortable; dilatation has disappeared. Urine: amount 1940 c.c., specific gravity 1021, urea 1.60 per cent.



CASE V.—Mrs. E. C., aged 41 years. November 22. Has increased in weight 30 pounds in past year. Dyspnea on exertion,



palpitation, and precordial pain in afternoon. Urine: amount 1050 c.c., specific gravity 1016, urea 0.95 per cent., no casts, no

albumin. Diagnosis: dilatation of left ventricle, slight aortic obstruction.

November 29. Less dyspnea, no palpitation, and no pain. Urine: amount 1500 c.c., specific gravity 1015, urea 1.25 per cent.



December 17. Feels much better. Urine: amount 1720 c.c., specific gravity 1022, urea 1.15 per cent.



CASE VI.—Miss M. E., aged 37 years. December 24. Swollen feet, faint sensations, nausea for past month. Diagnosis: slight mitral regurgitation, dilatation of the left ventricle. Urine normal, amount 1200 c.c.



December 28. No edema of the feet, nausea has disappeared. Urine: amount 1450 c.c.



January 3. No nausea nor other symptoms. Dilatation has disappeared. Urine normal, amount 1675 c.c.



From these tracings and clinical reports it is evident that the pulse-rate is slowed, the cardiac energy increased, arrhythmia lessened, and the amount of urine increased under the influence of adonidin. The remedy would seem to have a field of usefulness which is not entirely filled by digitalis. This is apparently in promptitude of action and the possibility of long-continued use without danger of cumulative effects or liability that the patient will become accustomed to the drug. The objection is that the irritation which it causes may sometimes prevent long-continued use.

THE THERAPEUTIC APPLICATIONS OF COLLOID SILVER

BY DRS. NETTER AND SALOMON

Physicians to the Paris Hospitals

THE credit for having introduced the use of silver into therapeutics, and made its value generally known, is due more particularly to Beyer and Credé, of whom the latter was pursued by the idea that asepsis in surgery is not always strictly to be counted on; and that the most serious consequences might follow the slightest omission in this ideal method. For this reason he set out to find a sufficiently harmless and non-irritating antiseptic, which, while not supplanting asepsis, would act as a complement to it, and would also be efficacious as a disinfectant in septic wounds.

In 1895 Credé learned from Halsted, of Baltimore, of the antiseptic action of silver leaf when applied to wounds; by that time he had already tried, but had soon abandoned, not only argonin and argentamin, but nitrate of silver, which had been used by his father in the prophylaxis of ophthalmia neonatorum. He immediately adopted this new form of silver with enthusiasm, and put forth every effort to perfect the method. Like Halsted he obtained good results from the use of metallic silver leaf; but noticing that it dissolved in contact with the liquids secreted by wounds, and experimentally during contact with the substances secreted by microbes, with the formation of lactate of silver, the idea occurred to him to try this salt itself, and he then tested the greater part of the organic compounds of this metal. Of the number he finally chose the lactate (lactol), soluble 1 in 15, and, preferably still, the citrate (citrol), only slightly soluble, 1 in 3,800, with which he obtained very good results as antiseptics both in the treatment of wounds, in surgical operations, and in the disinfection of hands and instruments. But both of these salts coagulate albuminous liquids to a certain degree; they are, furthermore, slightly irritating, and cannot, in consequence, be used in medical disorders hypodermically, by the mouth,

or in intravenous injections. Credé then turned to an allotropic form of silver, discovered in America in 1889 by Carey Lea, and called colloid silver, or collargol.

These experiments were first reported in 1897, and since that date Credé has used collargol in the treatment of infectious disorders, both medical and surgical. His example was followed by other physicians, and the method was even used in veterinary practice. Cases were soon published on all sides, some enthusiastic, others much more guarded; we shall see presently what is to be thought of these two points of view.

Collargol consists in small black grains, with a metallic luster, and easily crushed; it has no odor, its taste is not too disagreeable, and it is neither caustic nor irritating. One part of it dissolves in 25 of water, giving a brown, olive, or blackish color, similar to some dark kinds of beer. The preparation is not really a solution, but a condition of suspension of very tiny particles, which cannot even always be seen with a microscope. Acids and salts precipitate this silver from such solutions, which on the other hand can be more readily made and are more stable when a small quantity of albumin is added to them; even the small proportion of only 1 per cent. of albumin prevents colloid silver from being precipitated in its albuminoid combinations by salts and from being transformed into other compounds. The importance of this peculiarity is readily seen, as regards the therapeutic use of collargol.

When Credé had tried, in introducing colloid silver into the system, the gastric, cutaneous, hypodermic, and intravenous methods, he soon gave up the hypodermic method altogether; he reserves the gastric method for complaints of the digestive tract, and has finally adopted almost exclusively the administration of the remedy by inunction and intravenous injections. For inunctions he uses the following formula:

Collargol	15
White wax	10
Benzoinated lard sufficient to make	100

In hospital work we use

Collargol	15
Lanolin	20
Vaselin sufficient to make	100

Credé prescribes 1, 2, or 3 grams (15 to 45 grains) of this preparation, according to the patient's age. In intravenous injections he usually employs a 1 per cent. solution in distilled water; sometimes only a 0.5 per cent. solution, and at other times even a 2 per cent. solution. This solution should not be made by heating, as collargol stands heat badly and is thrown down in the solution. In internal administration he gives either 0.5 gram of both collargol and white of egg in 50 c.c. of distilled water, or pills containing 1 centigram ($\frac{1}{8}$ grain) of collargol in 10 centigrams of sugar of milk.

To forestall infection after surgical operations on the peritoneum and uterus Credé introduces into the serous cavity or into the uterus after the operation from one to four pills each containing 5 centigrams of collargol. This habit is justified by experiments that have shown that microbe cultures can be inserted into the rabbit's peritoneum without risk if at the same time a certain quantity of collargol is introduced as well.

Let us now see more in detail what Credé's technic really is, as we believe that this point is most essential, both for inunctions and for intravenous injections, so much so that we feel convinced that a large part of the objections that have been made to the method must be due to errors in technic. For inunctions Credé teaches that the skin must be prepared in such a way as to enable it to absorb with great easiness; for this reason the skin must be made ready and treated in just the same way as for an operation: the surface must be soaped, scrubbed, and washed with ether,—in a word, the pores must be made permeable, and the local circulation must be rendered as active as possible, to facilitate absorption. The inunction itself must be made with energy, like a hard massage, for 15 to 20 minutes, although Beyer has published cases in which absorption was demonstrated after a mere application of the ointment. Credé prefers the inunction to be made some distance away from the diseased parts, so that pain manifested by the patient may not interfere with the operation. All kinds of skins are not equally adapted to absorption, and the method cannot be applied to the obese, to infiltrated integuments, or to such as are too dry or too wrinkled. The points to be chosen in preference for inunctions are the joints and the inner aspect of the thighs, and after the operation the field should be covered with an impermeable tissue.

Intravenous injections should be made at the elbow, or in any

vein that may be specially prominent and may seem of easy access. Any sort of needles can be used, but with children we are in the habit of employing one with a very short bevel or else a little trocar with a canula adapting itself to Roux's syringe. When the usual antiseptic precautions have been taken, and an elastic ligature has been placed at the upper portion of the arm in order to make the vein more visible, the needle should be inserted, and the fact that it is really in the vessel can be verified by allowing a little blood to flow out, which will also generally enable you to avoid a trifling accident which we have sometimes seen occur, especially when we used needles with the ordinary bevel to the point,—distention of the perivascular sheath with formation of a small induration that took some time to disappear. The amount of liquid injected should vary according to the case and the age of the patient; with adults, and in very serious cases, Credé has hardly exceeded 10 cubic centimeters, and the quantity of collargol usually injected is from 20 to 50 milligrams in a 1 to 100 or 1 to 200 solution.

The intravenous injection is very well borne by the patients, and although the method has been extensively used abroad, no circulatory accidents due to these injections have as yet been reported. Credé did not employ them in man until he had seen them successfully used with horses, and the amount of collargol administered by the veins might be much superior to what is usually given, since no trouble was caused by injecting 5 grams of collargol at a single dose in the veins of a horse, or 10 centigrams in the vein of the ear in a rabbit weighing 2110 grams.

No intolerance is ever noticed at the doses that are advised, and up to the present time no signs of argyria have been detected after the use of colloid silver. Patients sometimes speak of a metallic taste in the mouth five or six hours after the inunction, but this is hardly worth mentioning; the same taste is sometimes noticed by the person who makes the inunction, which proves that the remedy is rapidly absorbed.

The only consequence of the intravenous injection that is worthy of note is a slight rise of temperature, sometimes accompanied by a rigor, that was pointed out by Credé, though this occurrence is more unusual now that a better product can be obtained. It was noticed more frequently in animals than in man.

Cases in which collargol has been successfully used in man are

very numerous; they lack, however, power of conviction, usually for the reason that not enough details are given.

Credé in his first paper laid special stress on the good results obtained in lymphangitis, phlegmon, septicemia, and in secondary septic manifestations. He showed that by these frictions a phlegmon can be arrested if it is treated before it suppurates. When pus has already formed the use of collargol cannot obviate the necessity of the knife, but it is useful, all the same, in hastening recovery.

A great many other observers then confirmed the efficacy of collargol in phlegmon, lymphangitis, erysipelas, and appendicitis. A number of cases showed the value of colloid silver inunctions or intravenous injections in puerperal infection. Phlegmasia alba dolens, which is so closely connected with the different forms of puerperal infection, has been improved frequently by the exhibition of collargol.

In all of the instances just mentioned the disorder was more or less dependent on the microbes of pus, staphylococcus or streptococcus, which were the only germs that Credé at first thought suitable for the collargol treatment. These same germs might at a pinch have been incriminated in serious forms of scarlet fever, in infectious pseudorheumatism or in very lasting forms of rheumatism, and in tuberculosis with hectic fever.

In 1898 Schirmer reported nine cases of epidemic cerebrospinal meningitis cured by collargol inunctions, and other similar cases appeared soon after. Two cases of anthrax in man, treated and cured by intravenous injections of collargol, have been published by Fischer and Schragge.

Müller de Bütow calls attention to the good results produced by those intravenous injections in over thirty cases, among which we find not only the diseases already mentioned, but pneumonia, typhoid fever, serofibrinous pleurisy, and serious forms of acute articular rheumatism.

We must finally mention the cases of serious infectious endocarditis reported cured by Wenckebach and Klotz. The efficacy of the intravenous injections in these cases cannot be questioned, and the detailed accounts of these patients that have been published enable us to form a very accurate idea of the usefulness of the method.

This all goes to show that Credé's method has progressed during the last five years. Still, even as it is, this progress has not been

as rapid as could be desired, and the method does not seem to have been much used in our country. We also observe that even in Germany this form of treatment has found great difficulty in getting admitted to the universities and large hospitals.

If we seek for the explanation of these difficulties we find that they are due to a variety of causes.

To begin with, experimental research has as a general thing not given very demonstrative results. There is no doubt about colloid silver being bactericidal, but it only manifests this action in large doses and after considerable lapse of time. Its preventive action is certainly more evident, but this does not suffice to explain the good results obtained in clinical medicine. In experimental forms of infection collargol has failed, as a general rule.

These first objections are evidently important, but still they are not such as to lead us to give up the use of colloid silver. The analogies between the experimental diseases of small animals and the spontaneous diseases of man are rather specious than real. Comparative pathology, on the other hand, shows us that in diseases of large animals the action of colloid silver cannot be questioned. Experiments *in vitro* can only enlighten us as to the bactericidal properties of colloid silver, and these properties only explain a portion, and probably the least important portion, of the efficacy of the method.

A certain number of physicians have tried collargol and have obtained no results from it, which has led them to consider it of no use. Thus Baginsky has treated thirteen serious cases of scarlatina with collargol inunctions, with only three recoveries; yet with some of his cases the applications of the remedy were sufficiently prolonged (18 and even 27 days).

Stromayer, of Halle, reports a large number of cases of different kinds, puerperal disorders, local forms of suppuration, purulent pleurisy, scarlatina, diphtheria, and phlegmon. He thinks that whenever suppuration has occurred surgical intervention is necessary; that collargol can only check inflammation when pus has not yet formed.

Osterloh reports cases of puerperal infection treated unsuccessfully by intravenous injections.

A certain number of the failures reported by these observers are possibly due to the fact that the collargol treatment was not always

carried out with sufficient perseverance, that the rules were not adhered to, and that the treatment was commenced too late. As a general thing these unsuccessful cases do not appear to us to be of very great importance. We think that the reason why the use of collargol has not spread more rapidly since 1897 lies principally in the fact that the successful cases published were in an altogether too summary style, so that the reader had no means of judging of the part taken by this treatment in the good results obtained. It was not until the end of 1901 and during the year 1902 that complete medical histories of cases, easy to follow, appeared in print. Especially to be mentioned were the two cases of anthrax in man, reported by Fischer and Schragge, and the cases of infectious endocarditis cured and published by Wenckebach and Klotz.

So far as we are concerned we have already used colloid silver in a great many cases, and cannot help being struck by the happy effect of this remedy, (1) in many patients whose chance of recovery seemed more than dubious, and yet who were rapidly restored to health (infectious endocarditis, puerperal infection, hypertoxic diphtheria); (2) in less serious cases, in which convalescence appeared much sooner than usual, and, finally, (3) in some cases in which the course of the disease did not appear to be much modified, but in which the patient's general condition improved in a noticeable way.

We have on a previous occasion published a certain number of these cases: pericarditis, pneumonia with purulent pleural effusion, typhoid fever, scarlatina, serious diphtheria, cerebrospinal meningitis, acute pneumonic tuberculosis, and purulent infection. Since then we have treated, or seen treated, with equal success various forms of suppuration, osteomyelitis, appendicitis, puerperal infection, infectious endocarditis, rheumatic endocarditis and chorea, grippe, erythema nodosum, phlebitis, bronchopneumonia, gangrene of a bronchopneumonic form, bronchial dilatation, serofibrinous and purulent pleurisy, otitis, angina, etc. From this will be seen that we have had to deal with a great variety of complaints, in which many different pathogenic agents are concerned, and that, in general terms, collargol appears to act in the greater number of infectious diseases. Several of our colleagues in the Paris hospitals have tried the method in different diseases (pneumonia, typhoid fever) and have told of results equally favorable.

We do not hesitate to advise its use in the majority of infectious diseases, whether they be simple forms of infection, or forms of associated infection, such as pyemia, septicemia, generalized or attenuated puerperal infection (phlegmasia alba dolens, etc.), infectious endocarditis, cerebrospinal meningitis, serious cases of scarlet fever, associated diphtheria, serious forms of typhoid fever, certain forms of tuberculosis with a pneumonic tendency, pneumonia, the various forms of bronchopneumonia, rheumatism with visceral tendencies, grippe, and appendicitis.

The action of collargol is denoted in certain cases by a rapid fall in temperature; in some cases this decrease is observed the day after the inunction or intravenous injection, while in others the fall is progressive (lysis), and may only be noticed after several days.

Besides this, marked improvement in general condition is quickly noted, the patient referring to it himself, and showing signs of appetite and a desire for sleep; the period of convalescence is not long in appearing. Credé had carefully noted these modifications and said that the improvement in the general and local condition of the patient was often so marked in 24 hours that those who witnessed this result for the first time were absolutely amazed. Still, it should be clearly understood that in most cases things go much less rapidly; no miraculous results must be expected from collargol, although it is a most valuable remedy, that will be of the greatest service in a large number of cases, and even in many for which there may seem to be no hope. In order to obtain such results the inunctions must be persevered with for a certain length of time, and it is often useful to make two or three of them per diem. Finally, the intravenous injection must not be looked on as a dangerous method; it should at once be resorted to in all cases that seem truly serious, and should be repeated as long as it may seem indicated.

Credé lays great stress on the advantage to be derived from treating the disease by this method from the outset, and to us the results have seemed better in proportion as the treatment by collargol had been instituted at an early date. Its use must not be thought to interfere in any way with the other usual forms of treatment which experience has shown to be indicated, and since the method has never done any harm, and the remedy has never caused argyrisms, it can almost always be commenced at the outset of the disorder.

WHAT IS THE CURE FOR NEURASTHENIA?

BY ROBERT T. EDES, M.D.
Of Boston, Massachusetts

A PHYSICIAN who was treating those diseases by hypnotism, which like many other new and occult methods was not at that time so overmodest that it would not claim all that was its due, remarked to me, "Hysteria and neurasthenia are incurable diseases." Yet we often hear people speak of their "nervous prostration" as if it were about on a par with bronchitis or diarrhea, or, at the very worst, the grippe. Without insisting on the remark, which is true in spite of its being commonplace, that the truth lies between the two extremes, we may add another: that difference of opinion is often a difference of definition, and that the hypnotist was talking about the disposition, diathesis, or tendency, and the others, if they had a definite meaning, about temporary attacks or paroxysms; the first about the defect of nervous energy, the others of mere fatigue.

The nervous centers, of a delicacy of structure and complication of arrangement so great that each improvement in microscopic technic discloses new minutiae, of which there is no reason to suppose that we are approaching the end, have yet for each individual their peculiarities as well marked and as difficult to change as his height, figure, or complexion. Notwithstanding this almost infinite delicacy and complexity of structure and its sensitiveness to so many influences, it retains with great tenacity for each individual his peculiarities and his capacity for work and endurance.

It seems to me that this capacity is not exactly the same thing, as it is often expressed, as his reserve of nerve force, but rather its ability to restore itself when the ordinary every-day store is expended. At any rate this is true within physiologic limits, and when we have begun to draw on the reserve we are in the region of pathology. To speak in anatomic terms, we may suppose that fatigue deals with the contents of the neuron, which can be used up and restored rapidly, but nervous exhaustion with its structure,

which is changed and atrophied so that a much longer time is required to bring it back to the normal. Or, in other terms, physiology and fatigue deal with income, pathology and neurasthenia with capital which is being used up for current expenses. To carry this comparison a little further, insanity and hysteria are not so much dependent on want of sufficient income or on too profuse expenditure as on the way the income is disposed of in producing regular and useful effects. Although, of course, the neurasthenia—that is, the insufficiency of income—may be involved in either case, it is not the essential feature and fully developed insanity can exist without it.

In the neurasthenic diathesis the capacity for restoring expended energy is not vigorous enough to make up for rapid and extreme loss and the capital is in danger. In the developed neurasthenia the expenditure has gone on and the capital is actually diminished. Neurasthenia is, then, a relative term, and its development among the great portion of civilized mankind is a question of the amount of work with reference to the ability to do it, and the strain under which it is carried on. We can get nothing out of the nervous system for which nature and education have not supplied the conditions. It is not, indeed, all a matter of heredity, although this may and does indicate limitations, but a great deal can be done, if done in season, with the lesser resistances in strengthening them and preparing them to bear their loads more judiciously and therefore more safely.

Much can be done toward the prophylaxis of neurasthenia in the school-room even if home and heredity have not helped in the accomplishment. There are all degrees and grades of resistance, from the men, not rare, upon whom the most strenuous intellectual life has no permanent depressing effect, to those to whom the "grass-hopper is a burden" not to be carried without complaint and fear of breakdown; but these grades do not at all correspond to the value of the work accomplished. The man who never gets tired may be expending his energy in doing harm as well as in doing good, and his nervous breakdown might be an undisguised blessing to the community.

And, on the other hand, it is not a thankless task to help those endowed with less resistance to make use of their powers to their utmost advantage. Much work of the very highest quality has been

done by men who were on or over the border of neurasthenia for a great part of their working lives.

Many of these have been recently studied by Dr. Gould, and even if we disagree with him as to the exclusive nature of the origin, and doubt if they would all so surely have gone on without fatigue had they only been furnished with the proper spectacles, it is extremely interesting to see how much literature (Carlyle, Browning, Parkman, DeQuincy, Whittier, George Eliot, Lewes), philosophy (Spencer, Nietzsche), art (Wagner), and science (Darwin, Huxley) owe to men and women who were subject to nervous drawbacks of great severity.

Of course the mind of the highest quality backed by a physique incapable of feeling fatigue is the ideal, but the output of the "*mens sana in corpore insano*," as expressed by one notable example of such a combination, is by no means despicable.

What is reasonably to be expected in the cure of real neurasthenia,—that is, the restoration of the nervous system to its full capacity for work?

It is certainly not reasonable to expect so to make it over that it can carry on functions of a higher grade than before or to look for a development of energy beyond its original possibilities. If such results should be apparently attained in exceptional cases it shows that the capacity was not correctly gauged or the possibilities not fully developed. In order to make a reasonable prognosis the measure of the patient should have been taken, as shown by what he has been doing, or by the estimate of those who have known him longest and best, and not by his own vanity, ambition, or sense of duty.

There is a large, important, and sometimes interesting class of cases which furnishes a seemingly sharp contradiction to what has just been said. It consists of those who have had from a very early period, or have acquired by a wrong education, not any real nervous weakness, but a non-development of real strength, or its suppression by imagination, or by the idea of weakness, rather than any actual deficiency in the storage of energy; the lazy who have no desire or sufficient inducement to work, those who are prevented by timidity from trying, and those in whom the fixed idea inhibits all effort. This is, together with those in whom a real neurasthenia has disappeared and given place to its memory or simulacrum, the class

which furnishes the marvel cures and which confounds the prognosis both of those who have hoped to restore them by medication or by merely promoting their nutrition, and of those who have condemned them to hopeless and chronic invalidism.

Rest is, of course, the treatment of fatigue. The treatment of neurasthenia and other affections associated with it, especially many diseases of women, by cutting off as nearly as possible all bodily exertion for a time, has not only become the foundation of the cure in this the country of its origin, but is known all over the civilized world by the name of its originator.

Its good effects are often not limited to the rest it gives to the organ of mental action and of attention and will,—that is, the cutting off of many external sources of stimulation and relief from active thinking,—but includes that of other functions, such as the sexual and of eye-strain. Dyspeptic troubles are also avoided by the feeding of plain food at short intervals and by passive exercises. All this is the relief of fatigue which contributes largely to and may, if other influences are favorable, in time complete the cure of neurasthenia, but it is not in itself the cure of the chronic nervous condition.

It has become generally known since the wide-spread adoption of this rest treatment that although this relief is great and may, as just said, lead to the permanent recovery, yet in others it does not, and the patient either gets to the point where a life of indolence can be just sustained with comfort, or else if the strain reaches its former height breaks down again.

The only method of increasing the strength of a muscle, supposing, of course, that it already has at its disposal a sufficient supply of material from the blood, is its exercise, and this exercise is to be had only by offering to it some resistance to be overcome, which may come from a tool, a machine, a gymnastic apparatus, the muscles of another person, or its own opponents in the limb or the body.

The same is true of any active nervous function up to the highest cerebral, and it is pre-eminently true of the will and attention, the failure of which underlies many of the phenomena of neurasthenia, if indeed it be not the thing itself.

The same principles of cure must then apply, and the same sort of success be expected when the nervous centers have been brought

up from their condition of fatigue to their best previous condition, in that further progress is to be made by exercise, and a complete restoration up to the norm of the individual must come from increasing the use of the faculties which have fallen behind.

Fatigue depends not only on the using up of stored energy in the form of highly complicated organic molecules, but a clogging of the muscle- and nerve-cells with the resulting waste products. This first condition appears clear from the most fundamental doctrines of the relations of forces, and its results are apparently shown to the eye in the observations of Hodge and his followers. The second is shown by the experiment of injecting the blood of a tired animal into the veins of another, with the result of producing the same condition in the second animal, and also by the possibilities of restoring by such processes as massage the tired muscles much more rapidly than mere rest will do. This can, of course, be made clearer for muscles than for nerves, but there is no reason why the principle should be different.

In actual nervous exhaustion, as neurasthenia, it is hardly probable that the second of these two factors is of the same importance. It is certainly much less likely that a chronic condition, having its periods of improvement and of getting worse, should depend upon the accumulation of products which when present in smaller quantities can be washed out in a few hours than that it should be the result of an actual destruction of substances which have got to be replaced by growth, which is a much slower process than a simple renewal of supply or clearing out of débris.

The supply of new material, whatever it may be or wherever it is to be utilized, must come from the blood, but its deposit and elaboration into potentially active material must take place under the influence of the nervous and muscular substance itself.

Each substance, each kind of cell, perhaps each individual cell must select the special elements it needs and metamorphose them into the molecule whose destruction will liberate the appropriate energy. There is no reason to suppose that any real energy can be forced into the neurons by an excess of pabulum in the blood and still less if it only gets as far as the digestive organs. This is quite as true of so-called "nerve foods" and "nerve tonics" as of ordinary diet.

Overfeeding, that is, feeding beyond the real needs of the system,

can only do good by making sure that there is enough digested material in the blood for the utmost needs of the tissues, and those needs are determined by their inherent powers of growth under the control of excitations coming from the periphery.

Feeding beyond the wishes of the patient is another matter. The normal relations of appetite, digestion, and nutrition are likely to be considerably disturbed, and the dislikes and apathy of the patient must not be too carefully regarded.

The period of utter repose, if it should be necessary, which it certainly is not in the majority of cases, is then rather for the relief of the acute exacerbation than of the chronic condition. The various modifications in its rigidity which have been recommended are in most cases to be chosen, being, however, careful to keep the balance always in favor of more rest than fatigue, economizing in expenditure until the income reaches its maximum and the balance is restored at a point which is the normal for each person.

In this early period is the time, favored as it is by the general rest, to get rid of the accessory and contributing drawbacks, such as sexual and pelvic functional disorders, eye-strain, and to a less extent hindrances to easy hearing and respiration. These are, to be sure, as well as the dyspepsia, sometimes results instead of causes and improve with the general condition, but there may be a vicious circle established which is to be broken wherever it is easiest to get at it.

As soon as the muscles are in good nutrition—it may be at the very beginning—then their active movement contributes not only to their own development but to the exercise of the other end of the motor circuit,—that is, the cortical motor centers,—and, as soon as the movements are undertaken spontaneously, to that of the will and attention. It is unnecessary and impossible to particularize as to all the ways in which these ends may be brought about, but the object in all exercise for neurasthenic patients is to interest them, so that although the will is having its proper motor outlet the attention is directed not to the sensations and symptoms but to the accomplishment of some outside object. For instance, walking may be the best or the worst of exercises, according to whether it be done with an agreeable object,—a visit, a view, natural history, or looking in shop windows, or with a friend whose conversation takes the attention away from counting the steps or the time and the patient is thinking of what he sees and not of how he feels, or, on the con-

trary, whether it be a wearisome putting of one foot before the other to get over a certain distance or kill a certain amount of time. So with all sorts of exercises, employments, or games, the associations of all kinds are of much more consequence than the special muscles involved, and the moderate training of the attention in a healthy direction the object of prime importance. With one person a useful employment may fail to attract because it is commonplace, while an exercise that has no particular object in view seems much more like "Treatment" and develops a moral effect from this very deficiency.

The smaller muscles which are worked at high tension and with conscious effort, like those of the ametropic eye and sometimes of the fingers, are not to be included in these generalizations. Their education must be slower and special.

The nervous balance having been readjusted so that the income equals the outgo and mental work under the control of the attention is capable of going on indefinitely at a given rate, the permanency of this condition depends upon how well the patient understands or how far he is willing to preserve this safe rate,—whether he is willing to stop when he is really tired, whether he will let his work end at the end of the day, or, in short, how far he will accept his limitations and be content not to rival his neighbor in devotion to his labors.

No additional strength has been given to the nervous centers, although if serious handicaps have been discovered and removed there has been a practical saving and the useful output may have been considerably increased without the expenditure of any more energy or increase of fatigue.

The adoption, when possible, of the rhythm of work most suited to the individual is an important measure in the conservation of his energy.

The two extremes may be called "spurting" and "plodding," and each of them, or the less marked grades between them, may be the best adapted in any case. The two kinds are often early discernible in the school-room, and the fact that they are not so ill matched, as might appear, in the race of life has been a commonplace since the fable of the hare and the tortoise. Perhaps that event would have been even worse for the hare if instead of going to sleep he had been induced by his vanity to give too many points to the tortoise and then been fairly beaten. Nature has set the

pace for certain classes of workers at one day's work every twenty-four hours, and those who add nothing to this are in little danger of exhaustion. There are those to whom this condition is unattainable (on account of their own make-up or external conditions), and who must work by the job until it is done, and among them are for the most part to be found the higher classes of intellectual workers.

For many, again, the monotony of absolutely the same work day after day is in itself an added burden. They become tired, not because they do too much work, but because they expend at high tension their energy in bringing themselves down to enduring such a humdrum life.

If the man who naturally works by spurts can bring himself to the other method he will be safeguarding himself, but if from his disposition or the nature of his employment he cannot do this, he must distinctly recognize the fact that he stands in need of the rest at the end of the spurt which he could not distribute throughout.

In some kinds of work a great deal can be shifted onto habit, so that it goes on with a minimum of attention and consequently with comparatively little expenditure.

The responsibility of a good deal of routine work which when freshly undertaken means a severe mental labor can after a time be pushed down where it makes comparatively little draft upon the higher centers of attention.

The best preservative for mental health is an occupation to which one is attracted and not forced, which is interesting in itself and not simply for its results, which furnishes in itself the proper relation between psychic stimulation and motor activity, between income and outgo of nervous force, and where these relations are not disturbed by any physical handicap or by depressing and wasteful emotions. When the life-work, the winning of bread or of fame, or the satisfaction of one's intellectual and moral needs does not do this, the balance may be restored by a hobby. If the life-work be wearing from its monotony and want of independent activity, then a good outdoor hobby, which shall also in itself be interesting and give scope to psychic as well as bodily activity, may be the requisite complement. If the mental occupation be too strenuous, then a sport which makes but little demand on the cerebrum or on the muscles of high tension, especially of the eye, restores the balance.

THE TREATMENT OF GASTRIC NEURASTHENIA AND ALLIED CONDITIONS

BY GEORGE W. McCASKEY, A.M., M.D.

Professor of Clinical Medicine in the Fort Wayne College of Medicine,
Fort Wayne, Indiana

WITH the marvellous evolution of the clinical application of test-tube and microscope to the diagnosis of disease there has been, on the part of a large proportion of the medical profession, a tendency to ignore or at least minimize certain other more or less intangible features, the importance of which is beyond dispute. I do not say this with a view of disparaging the use of these appliances as aids in diagnosis. On the contrary, they are entirely indispensable, the only point being that they should not occupy the entire line of our mental horizon.

Among the obscure conditions which cannot be directly illuminated in the laboratory may be mentioned disorders of gastric function the result of nervous perturbation. One of the most frequently encountered and most important is gastric neurasthenia. To Leube is usually assigned the credit of first directing attention to dyspepsia of nervous origin, in 1879. It appears to me, however, that it is extremely doubtful if the credit should not go instead to our countryman, Dr. Beard. His book on neurasthenia was published in 1880, and in it he says, "In cases, not a few, nervous dyspepsia is the first noticeable symptom of nervous exhaustion—the earliest sign that the body is giving way; and for years the stomach may be functionally disordered before brain, or spinal cord, or other parts or organs show signs of yielding. The true philosophy is, that nervous dyspepsia is a symptom of the same general pathological condition as all the orders of symptoms here noted, and it may follow or accompany as well as lead this multitudinous army." But for several years prior to this Beard had been writing on this subject. At any rate, for a quarter of a century disturbances of this type have been more or less fully recognized by the leading practitioners and writers upon these subjects.

The integrity of the function of the stomach is based upon a threefold series of facts: proper innervation, adequate motility, and a secretion qualitatively and quantitatively adequate for its specific work. To these might be added a vascular supply of suitable volume and tension both for nutritional and secretory purposes.

The proper innervation of the stomach occupies an absolutely paramount position and controls both secretion and motility completely. The condition which we call neurasthenia is probably no different in the stomach from what it is elsewhere, and may be defined as a state of chronic fatigue in the nerve elements, due to an inherent weakness either hereditary or acquired, or perhaps in a measure to both. The anatomic basis of this condition has up to this time eluded our research. That some ultimate essential changes entirely outside of the pale of our present means of observation do really exist appears to me indubitable. By reason of this change which may exist in the cytoplasm or other ultimate elements of the nerve-cell or its communicating and transmitting prolongations known as nerve-fibers the nerve-cell is deficient in functional power. As the dynamic force of the nerve-cell is undoubtedly the result of chemical change in its interior, it is safe to say that there is a disturbance in its internal metabolism. The toxins and other retrograde metamorphic products must find their way to the surface of the cell before they can be taken care of by the machinery of elimination; and it is very probable that a surcharging of the cell-substance with these retrograde products, which the cell for some histologic or histogenetic reason is unable to expel, is responsible in a large measure for the complex phenomena known as neurasthenia in whatever domain of the nervous system it may be exhibited.

So far as the stomach is concerned, it is not possible in many cases to determine positively the precise nature of the morbid change which gives rise to the symptom complex, or even to determine whether it is within the stomach wall itself or in one of the higher segments of the nervous system. In a few cases which belong to the group of gastric neurasthenias, changes have been demonstrated microscopically in the plexuses of Meissner and Auerbach; and it is probable that similar changes would be found in many cases of neurasthenia, whether gastric, spinal, or cere-

bral, if sufficiently exhaustive research was carried out. Pathologically, such cases are more than neurasthenia. In other cases we appear justified upon clinical ground to conclude that the nervous disturbances of the stomach are directly connected with attacks of emotional instability, while in others they follow upon intense mental application. The results of these methods of overstrain or overtaxation of the brain may not be primarily manifested in that organ, or even manifested there at all, but simply lead to profound alteration of stomach function undoubtedly dependent, in the first instance, upon defective or perverted innervation, but also including as a consequence imperfect secretion and motility with all their attendant symptomatic phenomena. Many cases of this type have fallen under my own observation.

The therapeutic problems which confront us in dealing with these nervous disorders of the stomach are of the most difficult character. There is an old adage that "all signs fail in dry weather," and one might parallel it by remarking that all therapeutic indications are apt to disappoint us and require modification again and again in dealing with these cases. To begin with, there is indicated the general management of the neurasthenic even though the symptoms may be absolutely, or at least substantially, limited to the stomach. In spite of the fact that the patient's only complaint is gastric distress due to defective function, we must reckon with the state of the nervous system which underlies it. Upon this phase of the subject it would be irrelevant to enter at this time; and it is only necessary to remark that there is the same inherent caprice and bizarre tendencies in cases of neurasthenia rather strictly localized in the stomach that we find in cases of neurasthenia of more general character.

The treatment hinges, of course, upon the precise diagnosis, and this involves a careful and often repeated study of gastric function under varying conditions. One of the peculiarities of nervous disturbance of the stomach is the wide fluctuation in the amount of free hydrochloric acid, which may vary in the same case anywhere from hyperacidity to anacidity. Such fluctuations in the quantity of free hydrochloric acid must be regarded as one of the most reliable signs of the condition we are considering. If a patient chances to have no free hydrochloric acid on a single examination, and atrophy of the gastric glands is suspected, and

by subjecting the gastric juice to the proper test a normal amount of ferments is present, the suspicion becomes very strong that the diminished hydrochloric acid secretion is at least in part of a neurotic origin. Motility also should be carefully studied under varying conditions and will be found to fluctuate as widely as secretion itself. Having determined, however, that the neurotic feature is the prominent factor of the case, the diagnosis is by no means complete. For either primarily or secondarily, as the result of continued disturbance in gastric function, we have varying grades of associated gastritis. If these are severe, as they sometimes are, they make the case unusually difficult, as these patients are very apt to be intolerant of local treatment. They are, indeed, very apt to be made worse by indiscriminate lavage. Local treatment, however, of some character is beneficial in a large proportion of cases associated with gastritis, and, indeed, some forms of local treatment (as electricity) are of advantage when no inflammatory process can be demonstrated. In cases in which there is no *débris* in the fasting stomach lavage is not rationally indicated, and its use is reprehensible, especially if continued for any great length of time. A number of cases have come under my observation in which general practitioners have resorted to routine lavage simply because the patient complained of stomach disturbances, which were beyond doubt aggravated by the treatment, and which began to improve as soon as the treatment was stopped.

Electricity, and especially faradism in some of its various modified forms of application, is of great service in many cases of this class. The use of one intragastric electrode, the other being applied over the dorsal and epigastric region alternately, is of great benefit when there is defective motility, providing the introduction of the electrode does not give rise to too profound agitation of the nervous system of the patient. This, however, sometimes happens, and I have been occasionally forced to conclude that even though local treatment was indicated, whether it would be lavage or the use of the intragastric electrodes, more harm than good came of it, and other methods were substituted. The percutaneous method with one electrode over the stomach and the other over the dorsal region at the stomach level is an effective method of faradizing the stomach. It has been the habit of some text-books and writers who undervalue electricity as a therapeutic agent to claim that elec-

tricity thus applied does not, in fact, penetrate the stomach at all. I think I have demonstrated beyond successful contention by experiments on animals that currents thus applied do penetrate the stomach without a doubt.¹ If it is true in animals, it undoubtedly is in the human subject, and we may be perfectly confident that faradism thus applied will give us the legitimate therapeutic results of this form of electrical treatment in the stomach. This means, in my opinion and in accordance with my experience, an improvement in nutrition, tonicity, and secretion of the organ. It does not mean a direct visible or palpable contraction of the stomach muscle as an immediate response to the application of the faradic current. This, however, is only one way in which electricity produces its therapeutic results. It seems to me fairly well established that, independently of such visible contractions and in tissues where such contractions could not take place, there are catabolic influences and changes of some sort, the occurrence of which means a betterment of the local conditions.

Hydrotherapy is very beneficial in some cases. The method which I most commonly employ is the alternate application of the hot and cold spray or douche, at first limited to the abdomen, but later, if well borne, extending it over the entire body, finally applying the water hot enough and long enough to produce a deep color of the entire skin, followed by a similar application of cold water. It is rarely borne to advantage when given in the rather vigorous manner last indicated, and in many cases such treatments have to be very mild owing to the extreme irritability of the nervous system, while in others they are not borne at all. These are, however, very few; and it will be found that some mild form of hydiatic treatment will be borne in nearly all cases and will have a distinctly beneficial effect. Hot spinal compresses applied until the entire region of the spinal column is a deep red, then rubbing the same area with a piece of ice or a sponge wrung out of cold water, is excellent treatment in properly selected cases.

The diet of such patients is one of the most difficult problems to solve, and no general rules can be given; but the question must be worked out with each case, and will depend upon the relative

¹ Electrical Reactions of the Gastro-Intestinal Musculature. Read before the Amer. Gastro-Enterological Association, May, 1902. Published in the Medical Record, July 26, 1902.

involvement of motility and secretion, the irritability of the nervous system both local and general, and, of the greatest importance, the idiosyncrasies of the patient, which are extremely numerous and strongly marked in the group of patients under consideration. Above all, it must be remembered that a diet which is as nearly adapted to a particular case as it is possible to make it may suddenly and without apparent cause throw everything into "most admired disorder." This is, of course, the result of sudden disturbances on the part of the nervous system, characteristic of neurasthenic cases and often not depending at all upon any assignable cause. Frequently, however, close inquiry will reveal the hidden source in the form of some little business or domestic infelicity, which under normal conditions would be waved aside with a simple motion of the hand, but which with the nervous constitution presented is sufficient to produce most appalling results.

In general, it may be said that the diet must be amply nutritious, and frequent examination of the urine should leave no doubt that the nitrogen balance is being maintained. These patients cannot do well with a urea excretion of six or seven grams in 24 hours, or even five or three, as I have sometimes found. If digestion and appetite cannot by any possibility be improved in such cases, it is tantamount to saying that they are entirely hopeless, and, of course, it must be admitted that some of them are.

Furthermore, the food, while nutritious, should all be of the blandest and simplest character, and prepared in such a manner as will give the least amount of labor to the weakened organ. Broiled or roasted meats, fish, eggs, well-cooked vegetables, cereals, stale bread and butter (providing the butter is like Cæsar's wife—above suspicion), milk, if well borne, in very moderate amounts, as over-distention of such a stomach with liquid food is irrational in the highest degree, represent the sort of diet that has been found most useful in my experience. Of course, it is susceptible of wide variations along the same lines. Among the prohibited articles I would mention condiments of all sorts, large amounts of salt or pepper, organic acids, and fried foods of any kind whatsoever. Organic acids seem equally harmful, whether the tendency of hydrochloric acid secretion be high or low; and it is probably superfluous to remark that the frying-pan should be summarily and forever ejected from every well-regulated kitchen.

The drug treatment of these cases is, in accordance with my

experience, of very subordinate value. Were it not for the local irritant effects, the bromides would be temporarily useful in cases of marked erethism of the nervous system. They may be tried in small doses, say five or ten grains, well diluted, and not given when the stomach is empty, as their local irritant effect more than counteracts the general sedation. When they are strongly indicated, they can be given in somewhat larger doses by rectal injection, but this is rarely required. A single large dose of bismuth subnitrate on an empty stomach at bedtime is often useful.

As a matter of course, associated conditions, such as anemia, constipation, cardiac atony, and the like, must have suitable attention; but this, as well as many other such questions, comes within the range of the general therapeutics of neurasthenia, which it is not my purpose at present to discuss. Finally, in dealing with cases of this sort, it is essential that one should have an intelligent conception of the conditions that confront him and the sort of "cure" which can reasonably be expected in favorable cases. It must be borne in mind that we are dealing with a nervous system with a hereditary or acquired defect (or perhaps both) which is an integral part of its constitution, and can rarely, if ever, be entirely eliminated. Under favorable conditions, however, and with rational management, many patients, and perhaps the majority of them, can be made practically well, and, what is more important, can remain so if they have a full understanding of their condition and the limitations of their capacity for work. It is not, of course, possible for all patients fully to control their environments or limit their endeavors within the line of safety. Such patients, whether impelled by necessity or fatuous folly, will almost certainly have relapses again and again, and very possibly become disheartened with the contest and drift into permanent invalidism. Whether this occurs or not will depend upon the perseverance and tact of both the patient and the physician. With skill and tact and ample knowledge and experience on the part of the latter such a result could be prevented in many cases in which it occurs. It is therefore important that both patient and physician should understand that a "cure" is relative in character, and that in the severer types of cases the possibility of repeated recurrence will hang over the patient like the sword of Damocles, and will require eternal vigilance as the price of freedom from such attacks.

Medicine

THE INCREASED PREVALENCE AND MORTALITY OF PNEUMONIA DURING THE LAST SIXTY YEARS, WITH REFERENCE TO ITS PREVENTION AND TREATMENT

BY NATHAN SMITH DAVIS, A.M., M.D., LL.D.
Of Chicago, Illinois

It is generally conceded that the advancements in the knowledge of the causes of disease, both predisposing and exciting, during the nineteenth century and the various sanitary measures founded upon them, have resulted in so far diminishing the prevalence and fatality of a large majority of the acute febrile affections as to have added several years to the average duration of human life in this and most of the countries of Europe. This is doubtless true. Yet the same statistical evidence shows that during the last half of the same century the prevalence and fatality of pneumonia, nephritis, carcinoma, and mental disorders have been increasing in a progressive ratio. This is recognized as true, especially in reference to pneumonia, which, during the last decade, has rivalled pulmonary tuberculosis in the number of its deaths. And the prospect is that it will soon be accorded a place at the head of the list of disease destroyers of the human race.

Why pneumonia and the other diseases named should be increasing in their ratio of prevalence and fatality while nearly all other diseases have been decreasing has not been satisfactorily explained. It is fair to assume, however, that such increase is caused either by increased intensity of the causes, or by diminished vital resistance on the part of those attacked, or by lessened efficiency of the methods of treatment.

Until the middle of the nineteenth century pneumonia was generally regarded as a local inflammation of some part of the paren-

chyma of the lungs. Subsequently, when much attention was being given to pyrexia or high temperature, and sudden terminations by crisis in febrile affections, pneumonia was declared to be a general fever with coincident local pulmonary inflammation. Hence it came to be designated pneumonic fever, on the same principle that typhoid was called enteric fever. The correctness of this classification was soon after confirmed by the discovery of pathogenic germs as the specific exciting cause of the disease. The specific germ found in connection with a large majority of cases is *Micrococcus lanceolatus*. In a minority of cases it is *Bacillus pneumoniæ* or *Bacillus pneumosepticus*. If we assume that these germs, generally called pneumococci, act the part of specific exciting causes, then all the other agents and conditions, such as age, sex, climate, season, diet, and drinks, must be regarded as predisposing influences. As we have no proof that the pneumococci have been increasing in their pathogenic activity, we must look to the predisposing influences for any unfavorable changes in the etiology of the disease.

Attacks of pneumonia occur at all periods of life, from infancy to old age. They are more numerous in proportion to the population during the most active period of adult life, that is, from 30 to 50 years of age. But the ratio of deaths to number of attacks is greatest in infancy and old age. Sex also exerts an apparent influence, as more than twice as many males as females are attacked in any given community, especially during the middle period of life.

Both climate and season of the year exert a very marked influence on the prevalence of pneumonia, although some cases have been observed in every variety of climate and at all seasons of the year. But from the most reliable statistics on the subject, aided by my own observations during a period of more than sixty years of practice, I am satisfied that all the varieties of pneumonia occur most frequently in the middle and northern part of the temperate zone, and that more than two-thirds of both cases and deaths take place during the colder and more variable months of the year, that is, December, January, February, March, and April. And the smallest number are seen during July, August, and September. In this city (Chicago) pneumonia has quite uniformly begun to increase during one or two weeks of intense cold weather and to reach the climax of its prevalence during the two weeks following. Its prevalence has also been notably increased with each prevalence of influ-

enza or la grippe. Dr. Samuel Forrey, U. S. A., in his work on the climate of the United States and its relation to the prevalence of disease, based on observations and records furnished by the several military posts between the Atlantic coast and the eastern slope of the Rocky Mountains, says that pneumonia prevails most and is most fatal in the middle belt of the country where the range of temperature between the hottest days of summer and the coldest days of winter is greatest, with comparatively short transition seasons and longer summers,—while the northern belt, with its short summers and long changeable transition seasons, gave the highest ratio of rheumatic affections and inflammations of the respiratory mucous membranes, with less pneumonia. These important conclusions by Dr. Forrey were in the main confirmed by Dr. Daniel Drake, in his voluminous work on the climate and diseases of the interior valley of our country. The conditions that constitute climate vary from year to year in each locality, and so does the prevalence of pneumonia. But we know of no steady or progressive climatic or seasonal changes that could be supposed to cause a steadily increasing prevalence of the disease. This leaves of the predisposing influences to be questioned only those of food, drinks, and exercise.

There are no articles of food in general use that are supposed to increase the susceptibility to attacks of pneumonia.

The same, however, cannot be said in regard to certain drinks and narcotic drugs that are extensively used in all the countries of Christendom. Of these the most important and most extensively used are, alcohol, as it exists in all the fermented and distilled liquors and in many of the proprietary medicines and artificial foods; tobacco; and the different preparations of opium. According to official reports more than \$1,000,000,000 are paid annually by the people of the United States for alcoholic liquors, and nearly as much more for tobacco. And the people of nearly all of the countries of Europe consume still larger quantities of both these agents in proportion to their populations. Both these agents, like all other anesthetic and narcotic drugs, enter the blood and in it are carried to every structure of the body and directly diminish the sensibility and action of all nerve structures in proportion to the quantity used.

The alcohol especially not only diminishes the sensibility and activity of the cerebral and nerve structures, but, by combining rapidly with the free oxygen of the blood, it thereby lessens the

action of that important agent in maintaining natural tissue metabolism and secretion. Consequently, if its use is continued from day to day, even in moderate doses, it favors the retention in the system of toxic agents, both chemical and bacterial, and so impairs the protoplasm as to encourage tissue degenerations and marked impairment of the *vis medicatrix naturæ*, or vital resistance to the influence of all toxic or disturbing agents. And in regard to pneumonia, every important work on the practice of medicine published during the last half of the nineteenth century mentions the habitual use of alcoholic liquors as one of the more important predisposing causes of the disease and as greatly increasing the ratio of its mortality. But the protoplasmic impairment and diminished vital resistance are not limited to the individual drinkers, but are perpetuated in their posterity to the third and fourth generations. Therefore, it is often one of the chief determining causes of death in persons who had never drank alcoholic liquor, but had been born of parents who were habitual users of that agent. It is by such impairment of vital resistance in both parents and their children by the use of alcoholic liquors and other narcotic drugs that pneumonia and other affections of the lungs, kidneys, liver, heart, and brain are made to increase faster than the increase of populations.

- Another important cause of vital impairment and consequent predisposition to the diseases mentioned is found in the constantly increasing migration of the youth of both sexes from the country districts to the denser populations of cities and manufacturing towns. By thus exchanging the open fresh air of the country for the confined and less pure air of the workshops, stores, offices, and lodging-rooms of the city they are compelled to receive less oxygen through the lungs into their blood, to take less out-door exercise, and endure more mental anxiety, the combined effect of which is to impair digestion and assimilation of food, increase nervous excitability, and lessen vital energy and endurance,—thereby rendering them an easy prey for the tubercle bacilli, the pneumococci, and all other pathogenic germs. For it must be remembered that without a daily fair oxygenation and decarbonization of the blood there can be neither strictly natural tissue metabolism, the evolution of active vigorous protoplasm, nor the maintenance of the natural vital resistance to the action of toxic agents of all kinds. And if we candidly keep in mind the enormous quantities of alcoholic drinks,

tobacco, opiates, and other narcotic drugs that are being used by the people of this and other countries, and their direct effects on the vitality of both those who use them and on their children, and their indirect effect in creating and perpetuating poverty, with all its unsanitary accompaniments, we shall have an ample explanation or reason why the ratio of deaths from diseases of the lungs, liver, kidneys, heart, and brain continues to increase, notwithstanding all the modern sanitary improvements aided by the active warfare now being vigorously prosecuted against pathogenic germs and their ptomains.

That the ratio of deaths from attacks of pneumonia has increased during the last 50 years is very generally admitted. That an important part of that increase of mortality is due to the lessened vital resistance caused by the habitual use of alcoholic liquors and other narcotic drugs there can be no reasonable doubt. For all reliable records of both hospital and private practice show that the habitual takers of those agents are more liable to attacks, and yield double the ratio of mortality when compared with total abstainers, all other conditions being the same. And yet having carefully observed the actual results of the successive changes in the methods of treatment of pneumonia from the middle of the second quarter of the nineteenth century until the present time, I am fully satisfied that a part of the increased mortality is caused by the injudicious selection and use of remedies. The important advancements made in the departments of pathology and physical diagnosis during the first half of the nineteenth century enabled the educated part of the profession to follow the successive pathologic conditions of congestion, exudation, and resolution, or suppuration, with much accuracy, and to adjust the use of their remedies to each stage in the progress of pneumonia as in all other acute inflammations. For at that time it was uniformly classed among the local inflammations.

And the important objects to be accomplished by treatment were to lessen the congestion or over-fulness of the pulmonary vessels and right cavities of the heart in the first stage; to limit the intensity of the fever and promote an early crisis without suppuration in the second stage; and to sustain the strength and nutrition of the patient in the third stage. If the patient was seen during the first stage, that is, within the first 24 or 36 hours after the initial chill, and while the small dry crepitant râle was audible over the affected part

of the lungs, with only moderate dulness on percussion and active general febrile reaction, a prompt venesection was resorted to and the blood allowed to flow until the respirations were easier and deeper, with less redness or flush of the face, and brighter redness of the blood flowing from the arm, and then it was stopped, and not unfrequently slight faintness and general perspiration followed while dressing the arm. The amount of blood lost to produce these effects in adults varied from 8 to 24 ounces. This was closely followed by sedatives and alteratives, such as antimony and calomel, given alternately in small doses and repeated every two or three hours until the latter caused free intestinal evacuations and free secretions from the liver and kidneys. By such means the diminished blood-pressure in the pulmonary capillaries and right cavities of the heart produced by the bleeding was perpetuated through the first stage and thereby much diminished the exudation into the alveoli and connective tissue, constituting the hepatization of the second stage. And, in addition, the calomel was one of the best intestinal antiseptics and toxin evacuants through the liver and kidneys yet known, though then antiseptics and antitoxins were unrecognized.

In a large majority of cases treated thus during the first stage the extent of lung solidification in the second stage was moderate, the pain in the chest and difficulty of breathing not great, and expectoration was free.

The continuance of slightly anodyne expectorants, a powder containing 5 grains (0.3 gram) of Dover's powder, 2 grains (0.5 gram) of powdered gum camphor, and 1 grain (0.06 gram) of calomel at night to favor sleep, followed by a rectal enema each morning, generally brought the end of the second stage between the fourth and seventh days.

The third stage or beginning of convalescence was treated with more food, bitter tonics, and the maintenance of regular evacuations. In unusually severe attacks, in which the physical signs and continued pain in the chest indicated continued extension of the disease after the free bleeding, a second venesection was sometimes practised, but more frequently a liberal application of cups or leeches was substituted, followed by fomentations and then blisters. If the cough was frequent and expectoration difficult, instead of slightly

nauseating doses of antimony we gave the following combination with almost uniform good effects:

R	Ammonium hydrochlorate	4 drams	15	
	Antimony and potassium tartrate	2 grains		18
	Morphin sulphate	8 grains		20
	Glycyrrhiza syrup	4 ounces	120	
Mix. S.—5 c.c. (one teaspoonful) every three or four hours.				

Calomel was given as previously described and also the Dover's powder and camphor at bedtime, if needed. If during the second stage the expectoration became more purulent and the systole of the heart weaker and more frequent, carbonate of ammonium and pulverized gum camphor were substituted for the ammonium hydrochlorate, antimony, and morphin mixture, and more milk, meat broth, and sometimes wine-why were given for nourishment. In localities where malarial fevers prevailed during summer and autumn, the attacks of pneumonia during the winter and early spring months were often characterized by unusually severe initial chills, and were favorably influenced by a few antiperiodic doses of quinin during the first two days and 2 or 3 grains (0.13 or 0.20 gram) each morning subsequently.

Such is a brief statement of the much-abused antiphlogistic and blood-letting treatment of pneumonia by myself and the great body of intelligent practitioners during the second and third quarters of the nineteenth century, and with a less ratio of mortality than under any other system of treatment either before or since that period of time. It was during the same period, however, that the profession was assailed through the secular press by Thompsonianism with its lobelia, Cayenne pepper, and No. 6, on one hand, and Hahnemannism with its *similia similibus* and infinitesimals, on the other, aided by a few philosophical writers on the curative powers of nature in our own ranks. And soon it became difficult to persuade many patients to submit to the loss of blood at the proper time. Fortunately, however, in consequence of the active progress being made in pharmacodynamics, such drugs as digitalis, aconite, veratrum viride, and strychnin enabled many to control the cardiac and pulmonary circulation with the veratrum or aconite in the first stage, and with digitalis and strychnin during the second and third stages, very successfully without resorting to venesection.

Many others failing to make a skilful use of these drugs drifted

into a system of expectancy, that is, nursing and supporting the patient until nature could effect a cure.

This ended in the transference of pneumonia to the list of continued fevers, and the adoption of the theory that the chief danger in all acute febrile affections was high temperature, and a decade of antipyretics, chiefly of coal-tar derivatives, and the revival of hydrotherapy was the result. It required but a few years to learn that the whole series of coal-tar antipyretics reduced temperature chiefly by directly retarding the natural metabolic and oxidizing processes, and thereby causing the retention of toxic agents from without, and excretory products formed within, by which the duration of the diseases was prolonged and their fatality increased. As nearly all the deaths occurring during the administration of internal antipyretics were preceded by great cardiac weakness, it soon led to the adoption of the still prevalent theory that the chief danger in febrile and inflammatory affections is "heart failure" instead of high temperature.

Consequently, during the last ten or fifteen years, so-called cardiac tonics and stimulants have been called for and used in the treatment of pneumonia and other acute diseases with as little discrimination as were the antipyretics of the previous decade. Medical teachers and writers emphasized the necessity of noting the first indications of cardiac weakness, that no time should be lost in commencing the use of special cardiac and vasomotor tonics, of which alcohol, strychnin, digitalis, and carbonate of ammonium were declared to be the most reliable. In a large majority of the cases of pneumonia the use of the first two named were commenced with the beginning of the second stage of the inflammatory process, and generally continued in progressively increasing doses until either convalescence or death ensued.

The alcohol is given in the form of whisky or brandy every two or three hours, and the strychnin either alternated with it or by hypodermatic injections at longer intervals. As the two remedies are directly antagonistic in their effects upon the cerebrospinal, respiratory, and vasomotor functions, the alcohol by its anesthetic properties diminishing all the functions named and the strychnin stimulating them all, the one so far neutralizes the other that the most noticeable effect of even large doses of both drugs is a greater tendency of the patient to sleep with less depth of inspiration and less

frequent efforts to cough, which causes both patient and friends to think he is doing well and the full amount of alcohol is continued. As he approaches the crisis of the disease with his blood and brain impregnated with the alcohol, which has been administered faster than it could be either oxidized or eliminated, his sleep changes to stupor or muttering delirium, the uninflamed portions of the lungs become edematous, his discharges involuntary, his extremities cold and cyanotic, and he dies with the right cavities of the heart distended with blood.

Had digitalis and carbonate of ammonium been used in conjunction with the strychnin instead of the alcohol, the resulting fatality in a large proportion of cases would have been avoided.

From a long and ample clinical experience in both hospital and private practice, I am certain that if the administration of alcoholic or other anesthetic drugs were omitted entirely from the treatment of pneumonia and the disease left to a judicious use of such other remedies as have been mentioned above, the present ratio of its mortality would be diminished one-half. I have said nothing concerning the use of antitoxins or antitoxic serums in the treatment of pneumonia, simply because none have been, thus far, discovered capable of destroying the pneumococci or their ptomains after the active phenomena of disease have commenced.

THE PRACTICAL APPLICATION OF CRYOSCOPY TO MEDICINE

BY HENRY W. CATTELL, A.M., M.D.

Formerly Editor of the *INTERNATIONAL CLINICS*; Author of "Post-Mortem Pathology;" Translator of Ziegler's "Special Pathology," etc.,
Philadelphia

BEFORE considering the subject of cryoscopy, which is defined by Raoult¹ as the study of the freezing-point of solutions, it may be well to state Gay-Lussac's, Mariotte's, and Avogadro's well-known laws, and to refer briefly to the work of Blagden, Clausius, J. J. Thomson, Stoney, Vant' Hoff, and Sante Arrhenius.

Gay-Lussac's law (1805) is, that the combining volumes of all elementary gases are equal, excepting those of phosphorus and arsenic, which are only one-half those of the other elements in the gaseous state, and those of mercury and cadmium, which are double those of the other elements; or, stated as a definition of atomic weight, the atomic weight of an element is its specific gravity in the gaseous state compared with hydrogen, with the exception of mercury and cadmium, in which the atomic weight is twice the specific gravity, and phosphorus and arsenic, in which the atomic weight is one-half of the specific gravity. Mariotte's or Boyle's law (1661) is, that the volume of a gas is inversely as the pressure; the density and the elastic force are directly as the pressure and inversely as the volume. Avogadro's law (1811) is, that equal volumes of all gases contain an equal number of molecules.

Blagden² observed many years ago (1787) that the more of a given solid there is in solution, the lower is its freezing-point. This

¹ Sur le progrès de la cryoscopie ou étude du point de congélation des dissolutions, Grenoble, 1889. *Ann. de phys. et de chimie*, 1884, 6th series, vol. ii.

² On the cooling of water below its freezing-point. On the effect of various substances in lowering the point of congelation of water, *Philosophical Transactions*, 1788.

is the explanation for the water in the ocean not freezing as readily as fresh water.

Clausius (1857) found that if dissolved substances were acted upon by electricity certain of the atoms or radicals went, under certain conditions, to the negative electrode, which he called kations, while certain others, which he named anions, collected at the positive electrode. From this time on until within a few years the subject of ions was neglected.

J. J. Thomson, following out the suggestion of Crooks, insists that the particles emanating as cathode rays from a vacuum tube consist of particles much smaller than atoms, and that these particles are capable of becoming intimately associated with an ion under certain conditions so as to permit of a broad classification of bodies into two kinds,—those which in solution permit the transmission of electricity (electrolytes) and those which do not. The term electron has recently been applied by Stoney ³ to the electrical charge of an ion.

Vant' Hoff ⁴ announced in 1895 that equal volumes of different isotonic solutions contain the same number of molecules or fragments of molecules and have the same freezing-point,—that is, the osmotic pressure of a liquid is dependent on the number of the molecules in solution. Certain exceptions were noted, and those which did not follow the law were found to be electrolytes and those which did were regular bodies or non-electrolytes.

Sante Arrhenius, ⁵ the celebrated Swedish chemist, who has just been awarded one of the Nobel prizes, noticing the variability of the freezing-points in certain solutions, explains the inconsistency by the hypothesis that certain molecules are dissociated spontaneously into their ions, and these ions then act as molecules and thus lower the freezing-point. For example, in a concentrated solution of potassium chlorid such dissociation takes place to but a slight degree. If the solution, however, be very dilute, the number of potassium-chlorid molecules present is few, while there are found a large number of ions. When many substances enter into the solution, Raoult found that the lowering of the freezing-point is the

³ Editorial, Jour. Amer. Med. Assoc., June 13, 1903.

⁴ Zeitschr. f. physik. Chemie, vols. i and ii; Mém. de l'Acad. roy. des sciences de Suède, Stockholm, 1886.

⁵ Zeitschr. f. physikalische Chemie, vols. ii and iii.

total of the lowering proper to each substance. In such complex substances Sante Arrhenius, however, noted that there might be a combination of the various substances forming more complex molecules, and that these molecules being fewer in number, the freezing-point would not be lowered as much as one would be led to expect from a theoretical consideration of the subject.

To Raoult (1883) belongs the credit of first establishing the fact that the lowering of the freezing-point of a solution is inversely as the molecular weight of the substance in solution. According to Widal and Lesné,⁶ cryoscopy was brought into the field of medical science by Dreser⁷ in 1891, and three years later the further investigation of Beckman and Winter applied it to the study of the liquids of the body, such as serum, urine, and milk. Beckman announced the formula of $M = E \frac{m}{J}$, in which M = the molecular weight of the dissolved substance, E = a constant having the value 18.5 when water is employed, m = quantity of the substance dissolved in 100 cubic centimeters, and J = the observed depression of the freezing-point in degrees Centigrade. Later Hamburger,⁸ von Korányi,⁹ Bouchard, de Vriès,¹⁰ Vâquez and Bousquet,¹¹ and Mulon¹² applied it to the study of exudates and transudates in connection with the study of the osmotic tension of different solutions, endeavoring to explain by this method some of the great hidden secrets of normal and pathologic cellular physiology. They found that in these fluids the osmotic pressure was proportionate to the molecular concentration of the solution, the lowering of the freezing-point equalling the exact number of molecules in the solution. Lindemann thinks that the amount of absorption going on in exu-

* Applications cliniques de la cryoscopie, Bouchard's *Traité de path. générale*, vol. vi, p. 661, Paris, 1903 (Bibliography).

⁷ Arch. f. experimentelle Path. u. Pharmakologie, 1892, p. 303, vol. xxix.

⁸ Ueber die Bestimmungen der osmotischen Spannkraft von physiologischen und pathologischen serösen Flüssigkeiten mittelst Gefrierpunktserniedrigung, Arch. f. Anat. u. Phys., 1886, p. 476; Centralblatt f. Phys., 1894, No. 24.

⁹ Physiologische und klinische Untersuchungen über den osmotischen Druck thierischer Flüssigkeiten. (Bibliography.) Zeits. f. klin. Med., vol. xxxiii, 1897, and vol. xxxiv, 1898.

¹⁰ Arch. f. ges. Physiol., vol. xiii.

¹¹ Pression osmotique chez les êtres vivants; application à la médecine, Presse méd., April 5, 1890. Recherches cryoscopiques sur le serum sanguin, La plasmolyse et l'isotonie chez les êtres vivants, Thèse de Paris, 1901.

¹² Applications médicales de la cryoscopie, Thèse de Paris, 1901.

dates can be determined by the daily observation and estimation of the cryoscopic index of the urine divided by the amount of sodium chlorid voided in 24 hours. This interesting field cannot be touched upon here, but those interested in osmosis will find a most enjoyable chapter on this subject in Lazarus Barlow's *Manual of General Pathology*, a new edition of which has just (1904) appeared.

The apparatus most generally used in the Paris hospitals for cryoscopic determinations consists (Fig. 1) of a glass refrigerating

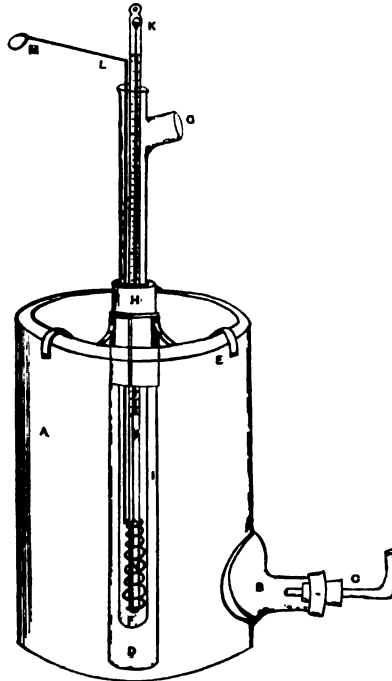


FIG. 1.—Cryoscopic apparatus. (For explanation of letters, see text.)

jar (A), at the base of which, on the side, is an opening (B), to which a tube (C) may be attached to draw away any fluid which may accumulate from the melting ice. In the center of this jar is placed a large test-tube (D), held in position by a metal triangle (E) attached to the brim of the jar. As this ring often hides the subsequent reading of the thermometer, there should be left a space of about one-quarter of an inch in the ring so as to permit of seeing the thermometer. A smaller test-tube (F), with an extra opening

in its side (*G*) and with a rubber band (*H*) about two inches from its neck, is placed inside of the outer tube, so that there is an inner chamber (*I*) between the two test-tubes, which may be left filled with dry air, or into which may be placed equal parts of glycerin and water. In the outer jar is packed a mixture of one part of rock salt and four of cracked ice, a mixture of equal parts of ammonium nitrate and water, or 20 per cent. of sodium carbonate and 80 per cent. of cracked ice, the latter mixture, according to Ferrannini insuring a temperature of -2.015°C .

About 15 c.c. of the undiluted fluid for examination is placed in the innermost tube and permitted to cool for some minutes; or if a number of observations are to be made at one time, the tubes or vessels containing the different solutions may be placed on ice previous to use. This procedure will save considerable time for the subsequent manipulations. The thermometer (*J*) is next suspended with the mercury bulb (*N*), covered by the fluid under examination and not touching the bottom or sides of the inner test-tube. This thermometer, which costs considerable money, should be extremely sensitive and very exact. It is registered from $+3^{\circ}\text{C}$. to -3°C . and graduated so that $\frac{1}{200}$ of a degree may be easily read. It is provided with a bulb (*K*) at the top to allow for expansion of mercury at the room temperature. Around the thermometer is placed a spiral wire mixer (*L*), which from the beginning until the end of the experiment—which should take about ten minutes for its performance—is constantly moved by the bent upper free attachment (*M*), so as to keep the liquid at all points equal in temperature. A larger outside mixer in the freezing mixture is used by Roeder,¹³ who also covers this jar.

The mercury, as the freezing progresses, falls slowly, then rapidly, to *below* the freezing-point, rests here for a moment, and then rises, due to the heat evolved, to the point of congelation, where it remains fixed for a sufficiently long time for the making of a careful observation. This is the freezing-point of the solution under observation, and in reading the scale of the thermometer the eye should be on a level with the mercury. A hand-glass may be employed if desired. The mercury then falls again until it reaches the tempera-

¹³ Der heutige Stand der Gefrierpunktbestimmung, Arch. f. Kinderheilkunde, vol. xxxiv.

ture of the outside freezing mixture. Korányi¹⁴ has shown that the introduction of a small piece of ice into the side opening (*G*) when the thermometer has about reached the freezing-point will facilitate the end reaction.

It is necessary before beginning work to make a blank test with distilled water, thus determining the accuracy of the thermometer, correcting any error in its reading, securing the personal equation of the operator, the condition of the freezing mixture, the time required to perform the test, and other data. When such conditions are once obtained, subsequent observation should be made in as nearly a similar manner as possible.

Raoult uses an apparatus consisting of a bottle hermetically sealed, from the brass top of which issue two tubes, one communicating with the external air, the other entering into the upper part of the bottle above the level of the liquid and forming a perforated coil around the test-tube containing the fluid to be examined. The refrigeration is produced by ether, the evaporation of this easily volatilized material being produced by an air current set in motion by blowing or by drawing air through the ether. A little ingenuity will produce a satisfactory apparatus from the ordinary glassware found in the laboratory, using ethyl chlorid as the freezing agent.

Widal and Lesné, in their article already referred to, give the result of a long series of studies upon normal and abnormal secretions and excretions. The greatest amount of work has been done on the urine and the blood, the best work taking into account both of these factors. Observers find the normal freezing-point of urine to be between -0.8° C. and -2.0° C., while that of the blood is quite constant, being in health -0.56° C. to -0.58° C. Any departure from these figures, especially when taken in conjunction the one with the other, ordinarily indicate renal or cardiac insufficiency. The increased use of bleeding as a therapeutic measure in pneumonia, apoplexy, eclampsia, parenchymatous nephritis, lead-poisoning, etc., will often fortunately supply the amount of blood required for these observations.

It is impossible, says Koeppe,¹⁵ to be enlightened on all points at one reading. Repeated investigations are necessary, and only

¹⁴ Arch. f. klin. Med., p. 425, 1900.

¹⁵ Physik. Diagnostik. der Nierenthätigkeit, Deutsche med. Wochenschrift, vol. xxix, No. 45.

when the reading remains approximately the same during the most diverse conditions are you justified in drawing practical conclusions from the findings. He finds that there is some disturbance in the kidneys when the variations of the Δ of the urine are never greater or very little greater than those of the blood, the diseased kidney always more closely approximating the variations of the blood. When the variation in the freezing of the urine of both kidneys is less than that of the blood, then the urine obtained by separate catheterization of the ureters exhibiting the greatest variation is the abnormal organ; but if the freezing-point of the urine of both kidneys is less than that of the blood, then the kidney excreting the urine with the greatest variation is the abnormal organ. This last condition is seen in cases of intense diuresis. Koeppe makes use of a diuretic, such as Salvator water, in order to elucidate this point. Bouchard, Claude, and Balthazard¹⁶ in their studies found the urine, after the use of cardiac diuretics, copious libations, or saline injections, to vary from -0.18° C. to -0.16° C.

Korányi has worked out an ingenious theory to explain renal insufficiency, which is well explained in English by Walsh¹⁷ and Grim.¹⁸

In studying renal insufficiency the blood should in all cases be taken at the time of the collection of the urine. Care must be used in the mode of obtaining the blood, because blood taken by means of a wet-cup will, on account of the presence of more carbonic acid gas, have a freezing-point lower by -0.02° C. to -0.05° C. than that taken directly from the veins. This fact has been proved by Kovacz,¹⁹ who succeeded in making the difference disappear by the passage of oxygen for four minutes through the blood thus obtained. Similarly the venous blood has a higher molecular concentration than that taken from the arteries. His²⁰ found that there was no difference in the cryoscopic reading of the blood when taken with

¹⁶ La cryoscopie des urines dans les affections du cœur et des reins, *Presse médicale*, Feb. 17, 1900. See also articles by BURTHER, *Medical News*, Jan. 23, 1904, and BERNARD, *Rev. de méd.*, vol. xxiii, Nos. 11 and 12.

¹⁷ Recent Advances in Diagnosis, *INTERNATIONAL CLINICS*, Tenth Series, vol. iv, 1901.

¹⁸ Cryoscopy, *Phila. Med. Jour.*, March 21, 1903.

¹⁹ Quoted from Widal and Lesné, loc. cit.

²⁰ Die Bedeutung der Ionen Theorie für die klinische Medicin. Congress deut. Naturforscher und Aerzte, p. 165, 1901.

and without the corpuscles, and that the blood could be used for examination several days after its withdrawal from the body. Moreover, certain variations are seen in health. As pointed out by Hindes,²¹ the urine of the young gives a lower average freezing temperature relative to the molecular concentration than adults and their blood has a higher concentration. In the old the urine is normal between -0.8° C. and -1.5° C. In pregnancy, according to Keim,²² at term, the urine index varies between -1.60° C. and -2.035° C., and the index of the blood is -0.507° C. to 0.551° C. Nobécourt and Delamare,²³ studying the urine of pregnant women, never found the freezing-point below -1.60° C.

In cases of drowning Revenstorff²⁴ determines the freezing-point of the blood from each side of the heart, basing his method on the fact that more or less of the fluid in which an animal was drowned passes into the blood through the capillaries of the lung and dilutes the venous blood. If the δ of the blood of the right heart is higher than that of the left, you will get additional evidence of the cause of death. Decomposition will, however, quickly remove any difference in the cryoscopic reading which may have existed; and Stoenescu,²⁵ agreeing with Carrara,²⁶ found in experiments on drowned animals that while fresh water lowered the δ of the blood in the right heart, salt water raised it. Moreover, the blood is not always diluted, so it must be remembered that the evidence is at best but corroborative. It is of interest to note that in Revenstorff's cases those giving positive cryoscopic results did not admit of the dilutions of the blood being recognized in any other way. In these cases the difference between the readings for the two sides were, for example, -0.48° C. to -0.68° C., -0.28° C. to 0.55° C., while in other cadavers the differences were slight, as -0.62° C., -0.77° C., and -0.81° C.

Revenstorff²⁷ also advises use of cryoscopy in determination of

²¹ Russki Vrach, St. Petersburg, No. 21, 1903.

²² Presse méd., Jan. 30, 1901.

²³ Soc. de biol., Oct. 12, 1901.

²⁴ Münchener med. Wehnschr., No. 45, p. 1880, 1902.

²⁵ Diagnostic de la submersion par l'étude cryoscopique du sang des noyés, Ann. d. hyg. publ., vol. xlix, p. 14, 1903.

²⁶ Schmidt's Jahrb., vol. cclxxiii, p. 105.

²⁷ Ueber Gefrierpunktbestimmungen von Leichenflüssigkeiten und derer Verwerthung zur Bestimmung des Zeitpunktes des eingetretenen Todes, Vjhr-schr. J. gericht Med. 37, xxii, p. 23, 1903.

the time elapsed after death. He noticed that the Δ of all the fluids of the body was lowered after death. The lowering is constant.

Lindemann²⁸ first used cryoscopy in differential diagnosis between suppurative and inflammatory processes affecting the lower genito-urinary tract and those affecting the kidneys. It was found that urine which had undergone ammoniacal decomposition became useless for diagnosis; therefore in cases of ammoniacal cystitis the Δ gives no index of the kidney condition and is an added proof of the necessity for the separate catheterization of the ureters. Later, when Kümmler²⁹ studied his series of 225 cases, including almost every pathologic condition in which surgery could be in any way indicated, he concluded that no operation should be practised on a kidney when the mixed urine had a freezing-point below -0.6° C., that in every case a cryoscopic test of the urine of each kidney should be made so as to know whether the other kidney was sufficiently healthy to do the extra work which would be allotted to it in case of nephrectomy.

Lindemann, in his studies, found the urine hypertonic to the blood in case of uremia and the molecular concentration of the serum below or at the normal in cases of nephritis which were not accompanied by uremia.

Korányi found that in uremic cases the freezing-point was from -0.49° C. to -0.59° C. Bousquet's researches showed the δ of blood in eclampsia varied between -0.6° C. and -0.62° C.

By cryoscopy Korányi, Bouchard, and others think a differential diagnosis could be made between the renal insufficiency of a cardiac case and of a pure renal case, but Grazia,³⁰ working with phthysical cases, doubts this.

Tinker,³¹ working in the Johns Hopkins Hospital, reported three cases of pus kidney which came to necropsy, in which he

²⁸ Bemerkungen zu den Untersuchungen über der Concentration des Harnes und Blutes bei Nierenkrankheiten, Deutsche Arch. f. klin. Med., vol. lxx, Nos. 1 and 2.

²⁹ Centralblatt f. Chirurgie, 1902, vol. xxix; XIII Congrès de méd., sect. de chirurgie urinaire, 1900. Die Grenzen erfolgreichen Nierenexstirpation und die Diagnose der Nephritis nach kryoscopischen Erfahrungen, Arch. f. klin. Chirurgie, vol. lxxvii, p. 487.

³⁰ Sul valore clinico della crioscopia della urine, Genoa, 1901.

³¹ Cryoscopy as an index of renal insufficiency in surgical diseases of the kidney, Johns Hopkins Hospital Bulletin, June, 1903.

made careful comparative cryoscopic studies of the blood and urine. The freezing-point in these cases of the blood was -0.71°C ., -0.69°C ., -0.63°C ., and of the urine -0.53°C ., -0.47°C ., -0.87°C .,—a strikingly different relation from that existing normally.

G. H. A. Clowes,⁸² in his studies at the Gratwick Research Laboratory of the University of Buffalo, has found a constant relation existing between the specific gravity of the urine and its freezing-point. Under a full diet and a reasonable limit in consumption of salts, medicaments, and alcohol, he prepared tables, in one column of which is found the specific gravity at 15°C .; in another the freezing-point observed Δ , and again the calculated freezing-point Δ' ; which is calculated by multiplying the decimal portion of the specific gravity, S , by 75, which is the average of the freezing-point divided by the decimal part of the specific gravity. He found $\frac{\Delta}{S}$ was a constant factor, being equal to 0.01337, or stated in other language, each 0.01 difference in specific gravity was approximately equal to a lowering of freezing-point of 0.75°C .; for example, if the specific gravity was 1015 the expected freezing-point would be $.015 \times -75$, or -1.125°C . He found this same relation to exist in the urine of normal individuals suffering from some abnormal condition, provided sugar and albumin were absent, but between wider limits. The diminution of chlorids when present in cases of cancer and typhoid fever produces less effect upon the freezing-point than would be anticipated. In such cases the loss in chlorids is partially counterbalanced by the larger amount of ammonia, uric acid, phosphates, and sulphates, which possess larger ions than the chlorids.

This increase is due to a tendency in the body to maintain a constant equilibrium in the average size of ions and molecules present in urine, and may account for the high retention of products of suboxidations and abnormal metabolism which exists in these cases. This view favors the therapeutic administration of chlorids to maintain the equilibrium and to aid in more complete elimination of the products of metabolism. In one case of cancer of the stomach, daily

⁸² Relationship between freezing-point depression and specific gravity of urine, under varying conditions of metabolism, and its clinical value in the estimation of sugar and albumin, *Amer. Jr. of Physiol.*, vol. ix, pp. 319, 1903.

examinations of urine were made during the last three weeks of life and showed Δ to average -0.74° C., while the chlorids were reduced one-tenth to one-twentieth of the normal.

In cases of epilepsy before and after the seizure the freezing-point was fairly constant. He concludes from these series that no constant proportion could be traced between chlorids or other chemical constituent either of normal or pathologic urine and the freezing-point. Bouchard³³ has found, however, that the same number of molecules of salt and of urea will lower the Δ equally. If V = volume of urine expressed in cubic centimetres passed in 24 hours, ΔV will equal the factor for the number of molecules passed by the kidney in this period. And this if divided by the body weight would give the number of molecules excreted by the kidney per kilogram of the body weight. The urine of the guinea-pig was also studied by Clowes.

An ingenious method by which the quantity of albumin may be estimated is also given. Clowes takes the specific gravity and Δ of the urine. A few drops of acetic acid are added and the urine boiled in order to precipitate the albumin, after which the solution is centrifugated and the specific gravity once more determined. This second specific gravity is reduced to the same ionic concentration as the first by multiplying its decimal portion by the freezing-point before boiling and dividing by the freezing-point obtained after boiling. This calculated specific gravity is then subtracted from the original specific gravity determined before boiling and the difference multiplied by factor 400, which will give the per cent. of albumin present in the original solution.

Crystalloid bodies exert an influence on osmotic pressure, molecular concentration, and the freezing-point, while colloid bodies, as albumin, have little or no influence, because their molecular weights are very high. Roeder³⁴ found that a 45 per cent. albuminous solution only lowers the Δ to -0.06° C., so that our thermometers are not sensitive enough for the ordinary albuminous urine, which seldom contains above 2 per cent. of albumin.

In diabetic urine Clowes shows that the quantity of sugar may

³³ Loc. cit.

³⁴ Der heutige Stand der Gefrierpunktbestimmung, Arch. f. Kinderheilkunde, vol. xxxix.

be readily estimated by determining the lowering of the freezing-point of the urine in question and its specific gravity, and then finding the theoretical lowering of the freezing-point from the specific gravity. The difference between the two quantities in degrees Centigrade, when multiplied by 6, which was first obtained theoretically and afterward shown by practice to be correct, gives a fair idea of the actual percentage of sugar present in the original sample of the urine. In a urine containing both albumin and sugar, the former is first eliminated by boiling with acetic acid, as above, and the estimation of sugar made in the same manner as if the sugar alone were present. Clowes verified all his sugar determinations by the polarization of light, fermentation test, reduction by Pavy's solution, etc. In studying severe cases of diabetes he got the best results from combining cryoscopy and polarization. In every case in which a difference arose between the reading from polarization and cryoscopy he proved it due to the presence of beta-oxybutyric acid, which interferes with polarization. When this difference occurs in several readings at intervals the presence of beta-oxybutyric acid in the urine may be considered as assured.

The practical bearing of cryoscopy is plainly seen in those cases in which the diagnosis rests between typhoid fever and pneumonia. Korányi found that if the δ was above -0.56° C. the patient probably had pneumonia, and that if he was suffering from that disease the passage of oxygen through the blood in a beaker would correct the reading. Oxygen should be given by the mouth, therefore, as a therapeutic measure until δ becomes normal. If the δ is not reduced by the oxygen, renal insufficiency could be considered established. Also if a fever patient has Δ less than 1.7 it is diagnostic of malaria. Lindemann thinks that the amount of absorption going or in exudates and transudates can be determined by the daily estimation of $\frac{\Delta}{NaCl}$. Widál and Lesné place value upon the determination of the freezing-point of the cerebrospinal fluid as affording means of distinguishing between the different forms of meningitis. Interesting variations have been found in the study of the cerebrospinal fluid by Widál, Sicard, and Ravaut.⁸⁵ It was hypertonic to blood serum and varied from -0.59° C. to -2.24° C.

Other fluids of the body have been examined, but the work upon

⁸⁵ Presse méd., Oct. 24, 1900.

them so far has been carried on by only a few observers. Gastric juice was studied in 1893 by Winter, who compared its freezing-point to that of the blood. It varied from -0.36°C. to -0.85°C. At the beginning of digestion it is very low, -0.80°C. diminishing until the end of digestion and then returning to -0.36°C. , which is the same as the freezing-point of 0.61 parts of sodium chlorid in 100 parts of water or a physiologic salt solution.

Saliva was studied by Fano and Bottazzi.³⁶ Maxillary saliva, excited by stimulation of the chorda tympani nerve of a dog, gave variations from -0.36°C. to -0.42°C. , while the mixed saliva studied by Sabrazès and Monthis³⁷ varied from -0.12°C. to -0.14°C.

Milk has been studied by Beckman, Dreser, Winter, Bordas, and Gerin. The freezing-point of milk varies between very narrow limits, -0.54°C. to -0.67°C. Bellei³⁸ studied to discover how the freezing-point varies under recognized modifications of quality and composition. He examined 50 samples of milk, determining in each case the freezing-point, specific gravity, milk-sugar, and ash. He found the freezing-point of normal milk varied from -0.53°C. to -0.57°C. and its specific gravity from 1029 to 1033. The milk-sugar showed 3.70 to 5.77 per cent., while the ash varied from 0.58 to 0.85 per cent. When milk became sour, the freezing-point fell and continued to fall as the souring process progressed. The addition of water raised the freezing-point and could be determined with certainty by cryoscopy. Ten per cent. of water might raise it to 0.51°C. Simultaneous addition of water, starch, and dextrin produced no effect except that due to the admixture of water. The freezing-point of scalded milk was lower than that of normal milk. Addition of water sufficient to bring its specific gravity down to 1030 or 1032 gave a freezing-point of from -0.53°C. to -0.55°C. , making it impossible to distinguish scalded milk by cryoscopy. The freezing-point was not affected by the presence of small amounts of sodium bicarbonate, salicylic acid, or boric acid, but was lowered by the addition of 2 parts of formalin per 1000 of milk. The cryoscopic study adds nothing to our knowledge of its nutritive value.

³⁶ Arch. ital. de biol., 1896.

³⁷ Soc. de biol., June 15, 1901.

³⁸ Freezing-point of milk, Il policlinico, Jan. 31, 1903.

CONCLUSIONS

(1) Cryoscopy has a valuable though somewhat limited use among laboratory methods in medicine. Its application is easy and the apparatus, if desired, can readily be taken to the house of the patient. Repeated cryoscopic examinations of the urine taken in conjunction with those of the blood afford a valuable means of determining the presence or absence of renal and cardiac insufficiency, more especially if separate catheterization of the ureters can be practised. But in all doubtful cases cryoscopy should be supplemented by the test for electric conductivity, the methylene-blue test,—the phloridzin test is considered by many dangerous,—the dilution test, and other well-known laboratory methods.

(2) It may be employed, according to Clowes, as a quantitative method for the determination of such abnormal constituents of the urine as sugar and albumin, notwithstanding the fact that albumin has practically no effect on the lowering of the freezing-point, in the amounts usually found in the urine, and as a qualitative test for the presence of beta-oxybutyric acid in urine, formalin or water in milk, etc.

(3) The relation of the specific gravity in health to that of cryoscopy is quite constant, and in disease it naturally varies much according to various conditions, such as the quantity and the quality of food and drugs taken, temperature, amount of sugar and sodium chlorid in the urine, etc.

(4) There is a personal equation in performing the test, which should always be determined by the testing of distilled water with the conditions to be used in the experiment and the correcting of the error, whatever it may be.

(5) The cryoscopic index or δ of human and guinea-pig blood (hemocryoscopy) is quite constant, -0.56° C. to -0.58° C.; that of the fetus being slightly less; when above this figure the blood is hyperosmotic, and there is insufficiency in the respiratory mechanism and in the secretion of urine; if lower, hyposmotic, as in chlorosis and tuberculosis; while the Δ of the 24-hour urine (urino-cryoscopy) varies from -0.8° C. to -2° C. in health. Similarly, one may speak of hypersthenuria and hyposthenuria.

(6) Cryoscopic observations may be an important corroborative

test in medico-legal cases, as in drowning, especially as to whether in salt or fresh water, and in differentiating the blood of certain animals. It may be used in determining the time elapsing after death, and possibly in differentiating and diagnosing snake poisoning, and other forms of poisoning which have a specific action on the blood, a portion of the work hitherto untouched upon by those working on this subject.

(7) The $\frac{d}{NaCl}$ of the 24-hour urine should not vary more than 1.23 to 1.69. If more than 1.69, we have oligochloruria; if less than 1.23, polychloruria.

(8) Is there not an underlying law that the specific gravity of the blood is 1056 while the freezing-point of the blood is usually -0.56° C., and the molecular weight of urea, the chief organic constituent of the urine, is 60, the mean ion molecular weight, according to Clowes, of all of the constituents of the urine being but slightly below this figure? There will also probably be found a direct relation of the δ to the viscosity of the blood.

NEPHRITIS OF GASTRO-INTESTINAL ORIGIN

**BEING LECTURE II OF A SERIES OF CLINICAL LECTURES ON DISEASES OF THE KIDNEY
DELIVERED AT ST. LUKE'S HOSPITAL, CHICAGO**

BY HENRY BAIRD FAVILL, M.D.

**Professor of Therapeutics in the Rush Medical College (in Affiliation with the
University of Chicago), Chicago, Illinois**

GENTLEMEN: In the previous lecture which dealt with what was designated acute toxic nephritis, this query amongst others was raised: Do these cases always turn out as favorably as those reported? The clinical history of many of them is brief though acute, and the recovery apparently complete. So general is this that one expects a favorable issue, and that with rapidity. It would be surprising if, with such acute reaction to some unknown poison, there were not at times grave conditions established, to make the prognosis less favorable. Such seems to be the fact as evinced by the following:

CASE III.—A lady of delicate type and constitution had been ill three weeks when I saw her in consultation. Her history for those weeks was that of obstinate constipation, taxing the resources of her attendant to the utmost to establish even occasional evacuation. Though this immediate difficulty was past, at the time I saw her, there remained a state of intestines not at all wholesome. The stools were foul and the tendency to distention with gas marked.

Passing various details that seem irrevelant, the case had the aspect of subacute intestinal toxemia, with considerable asthenia. The physician in charge pronounced the urine at that time to be essentially normal. Though I have not access to his record and cannot declare that there was no nephritis pre-existing, yet within two years previously I had made investigation of the same patient and my record is clear upon that point. I therefore assume that it was not a case of nephritis.

Within a few days I saw her again and she had developed nephritis; casts, blood, leukocytes, and albumin (1.5 per 1000, Esbach). Her general condition became worse, the urine showing more

abnormalities, and she fell into a gentle toxic delirium and passed away in a coma after ten days. No autopsy was made.

I am not disposed to think that this was a case of uremia as we have understood it, though I confess to being further from any satisfactory understanding of it than ever. I am inclined to think that the general systemic poisoning from the intestine was of primary importance, and that the kidney influence was but partial. It does, however, serve to illustrate, and this is the point, that such conditions giving rise to nephritis are liable to be fatal, even in cases of comparatively mild type. The prognosis hence needs reservation according to the general clinical aspect.

Though not of this group, perhaps, and yet somewhat allied are those cases of typhoid fever which develop early a savage nephritis and die early, within ten days. Three such cases have I seen within two years. To what extent the death is due to kidney participation is very doubtful, but the picture of intense toxemia with the kidney reaction that belongs to it, that is, in which the desquamative features, especially granular casts, very much outrank the albumin, is very impressive.

At this point it is as well to consider the objection that may be made that these transient manifestations are not truly nephritis. It is not uncommon in obstetric literature to find the statement that all signs of nephritis may be present and no nephritis. The meaning is, no doubt, that there is no recognizable structural change. Is that the definition and limitation of the term? If so we need another. But for the physicians who are regarding functional disturbance and later structural change from the view-point of toxic influence, the classical evidence of renal involvement will stand for the manifestations of an operating cause that may or may not be permanent, but which is logically itself the disease, rather than the terminal structural results.

It is true that there may be a distinct difference between processes that temporarily "irritate" the kidney and those that destroy it, but in spite of all we know to that effect, in clinical medicine, we are not given such discrimination and must take it as we find it.

The general tendency is to divert our emphasis from the local condition and to enlarge the scope of the vicious process to include systemic, or at least indirect causes. Whatever the facts may prove to be, at present we are dealing in terms of nephritis, on a basis of

certain admitted evidence. Our ideas of nephritis have so crystallized into conceptions of destructive progress that they strongly prejudice judgment as to the essential element in a fatal issue when nephritis is pronounced.

A careful interpretation of experience does not lead to the conclusion that the local failure is so important. This is true even in the advanced and obviously structural cases. Inasmuch as we have scant knowledge of the relation between the organic alterations and the clinical showings, it seems inevitable that the view of the subject should be modified, and the fact of nephritis be estimated as to gravity upon collateral conditions. This is manifestly the tendency at present, and it seems clear that it is well directed.

Let us then agree that for clinical purposes, the signs of nephritis constitute nephritis, and that the transient is for the moment not distinguishable from the fixed. It must, however, be said that the acute toxic forms are more strikingly desquamative, and particularly that one finds casts in a profusion not usual in the chronic type.

The further query is, Does nephritis of the acute toxic type have a tendency to recur? The form of this question implies that there is some relic of morbidity in the kidney. The question is more correctly, Does the general cause tend to provoke repeated attacks upon the kidney? Bearing upon that point, note the following histories:

CASE IV.—A young woman, 24 years old, of strongly neurotic type, but without significant previous illness, brought home from her summer vacation on a stretcher, is found in the following condition: Pale, haggard, temperature 103° F., abdomen tympanitic, and complaining of great pain in the epigastrium, and somewhat obstinately constipated. The history is that she has had several similar attacks of "stomach trouble" during the previous ten weeks. In the course of investigation as to her trouble, it developed that her urine contained albumin in large amount and casts in great abundance. Typhoid fever and other acute conditions being gradually excluded, the conclusion was reached that she was badly intoxicated from her intestinal tract. This proved to be the fact as far as one could judge, inasmuch as thorough cleaning out and starvation at once brought about relief, and in ten days the signs of nephritis had disappeared. In the course of four weeks, while still confined to bed and under treatment, the gastro-intestinal derangement recurred, and with it in a day or two the morbid urine. All the features of the attack, how-

ever, were present in less degree. The subsidence of the flurry was also prompt. Again in a few weeks this was repeated.

Because of her marked neurotic features the patient was taken to a sanitarium. During her residence there, covering a period of eighteen months, she pursued a course of acute mania, and at intervals during that period she had recurrence of this combination of gastro-intestinal eruption and accompanying nephritis. Complete recovery has taken place as to mind, digestive function, and kidneys.

My personal familiarity with the patient before this illness established the fact that she had no pre-existing fixed nephritis. Cases which show so clearly and so repeatedly this sequence of events are rare, but cases that suggest this in a less degree are common.

The inference is plain: I think the conclusion is justified that individuals who have shown this reaction tend to reproduce it under given conditions, but whether this implies specificity of toxic agent, or especial susceptibility of kidney, I am not able to conclude.

I would here distinguish between susceptibility and established structural change. Though we must admit that structural change can exist, and yield at any particular moment no marked signs of nephritis, and although that fact puts a doubt into all assumption of normality of the organ pre-existing, yet it is unreasonable to carry such reservation too far, and we may fairly assume that a structurally intact kidney may yield these signs. There is an added probability in the fact that these conditions occur in children. In illustration I cite

CASE V.—A child, 4 years of age, develops an attack of some acute intestinal disorder. In the absence of the family physician, a colleague attends the child. In the course of the illness he discovers in the urine a trace of albumin and a very large number of casts, mostly granular. The announcement of this to the family creates more or less consternation upon the assumption that it had pre-existed. Upon the return of the regular attendant, it developed that not only had it *not* pre-existed, but at the time there was no trace of it. Curiously, not long after the child had a similar attack in the absence of the family physician and the colleague was again in attendance. The renal phenomena recurred, and at this point I was introduced as a consultant. It is needless to say that such divergent findings lead to discordant conditions unless interpreted with wisdom. Subsequently these conditions recurred several times in the hands

of the family physician, and the significance of the situation became clear. The child is now well, with no suggestion of nephritis.

There is no reason to doubt the causal relation of the intestinal disturbance to the renal event, though by what agent and in what way I venture no hypothesis. The value of this last observation lies in the youth of the patient and the consequent greater probability that there was no underlying structural disease of the kidney.

If these foregoing experiences are correctly interpreted as some sort of response on the part of the kidney to toxic influence of remote origin and presumably transient, two questions arise of great importance: (1) How common is it that such kidney reaction occurs in the general run of individuals? and (2) What is the effect upon kidney function and structure of such attacks repeated many times in the same individual?

It is not possible to give a definite answer to either of these queries, but it is worth while to reflect upon the considerations involved in the first. How common is it to find renal signs in all sorts of illness?

One query I interpolate bearing upon this point. How generally is the urine examined in all classes of patients and how usual is it that it is examined *often* in the course of an illness. Unless we can assume that such observations are the rule, the fact that the experiences are not widely recognized as common is of no importance. In point of fact, routine and repeated examination of the urine in all classes of patients is beyond question *not* the rule, and much of that which is done is superficial and inadequate, especially lacking the microscopic observation, perhaps the most crucial point. It is hence not at all remarkable that these facts are not more generally recognized.

The experience of the few who do pursue the course of close observation is the only basis for conclusion, and that is not, so far as I know, broad enough to shed decisive light on this question of frequency. The broader one's contact with practice, either in private or in hospital, if he observe this matter closely, the more he will be impressed with the fact that albumin and casts appear and disappear in urines under a great variety of circumstances and in ways without clear significance.

Not only is this true in these violent gastro-intestinal attacks, but in many subacute cases of the same type, and in a very large pro-

portion of the acute infections, even the short and mild variety, such as the simple tonsillitis. The natural speculation is whether the occurrence is not far more common than any of us know.

Our bravest resolve to amend our ways and be more observing is hard to execute. The natural restrictions of convenience militate very strongly against the wide practice of urine analysis, and the conviction that it is not a crucial matter in any given case, permits a negligence that is quite incompatible with collective observation.

So far as my experience reaches it shows that the incidental and transient appearance of renal reaction is frequent in proportion to the closeness of my scrutiny. I am far from being beyond criticism in this performance and look longingly in the direction of ideal conditions for clinical observation, which thus far I have not seen.

The suggestion in this view is that the kidney is under far more frequent and perhaps more intense morbid influence, may I venture to say "irritative" influence, than we have been in the habit of recognizing. How important a factor it is in pathology must remain for the present a speculation, but one can scarcely avoid the suspicion that it is very important. Especially is one impressed with this in those cases which present a lingering remnant of trouble in the form of traces of albumin and few casts, which are subject to exaggerated outbreaks of the more typical sort. Such is

CASE VI.—A man of 40 years, full habit, and good habits, though an over-feeder. Occasional investigation has shown at times a faint trace of albumin and usually a few casts, for the most part hyaline. The patient is of a constipated habit and with a generally heavily coated tongue. In general, however, he regards himself as well. He presents himself for consultation, complaining only of "feeling badly" and with discomfort in his bowels. His temperature is normal, and no abnormal physical findings are detected except his urine, which had a heavy precipitate of albumin and abundant casts. He was put to bed, given *no* food, freely purged with calomel and salts, and recovered in about a week. As the albumin receded the casts become more plenty and all granular, but these in time passed away almost entirely. Subsequent observation while under treatment showed at times almost *no* casts, but on slight lapses in his intestinal conditions the albumin and casts tend to reappear slightly.

Were it not for a prejudice in favor of gastro-intestinal origin, derived from the very acute cases cited, and by analogy transferred

to this case, one could have little confidence in suggesting a causal relation.

The gradations from the severe and obvious to the mild and indecisive is so gentle that one is utterly at loss to make a line of demarcation, and the result is that an impression of a dependence even in mild conditions becomes fixed. Just in proportion as we attribute a gravity to these occurrences, do we raise more definitely the second question: What is the effect upon structural and functional power of repeated assaults upon the kidney?

I confess a great hesitation in broaching this subject and only do it with the avowal of no opinion and but limited knowledge. The data from which to draw a conclusion do not exist, and one must discuss it, recognizing it as speculation. There is a place, however, for speculation upon the bearing of observed facts, and there are points of interest in this connection. I have used hesitatingly the term "irritative" to describe the nature of the impression made upon the kidney in these states.

It is to be remarked that our knowledge of the urine as a toxic body is very limited. Beyond all question the great vehicle of excretion, it is known to us only in a few details, and these of import not understood. Our method of determining toxicity is crude to the point of impracticability, and of the substances which we do measure we scarcely know the significance. That the urine may contain substances of the most important character in their bearing upon the integrity of the kidney is not to be denied, and pending this investigation we are not at liberty to discard this possibility of an irritative value.

For example, observation in relative acidity of urine will show most significant relations between the extremes in acidity and various clinical phenomena, and finer differentiation will doubtless much increase our clinical methods and inferences. Yet such observations deal with the crude facts for clinical aids and of practical value, and are probably far from being of specific significance in respect to the organic degenerations. For purposes of discussion we may construe contact as irritation, but from a pathologic stand-point we have no sufficient grounds for any such statement of the case. The tendency is natural to consider the matter as an irritation, but the farther we travel away from the idea of inflammation as the essential process in nephritis, the less use we have for the idea of irritation.

Clearly the trend of opinion is away from the inflammatory idea and toward some specific cellular degeneration as yet unaccounted for.

As I have before suggested, the idea involved in the cytolytics, the specific cell solvents, is so broad as to be at present beyond definition. To conclude that kidney degeneration at large is due to the operation of a "nephrolysin" is premature and unwarranted, but to wonder strongly if it be not so is unavoidable. This concept, however, neither does away with nor clarifies the subject under discussion, for chemical products of toxic power over cells is still the necessary assumption, and we have no knowledge of the relation to these of the gastro-intestinal laboratory. No assumption could be or need be made that this relation is an immediate one. It is the frequent and obvious sequence in clinical experience that I emphasize and without statement as to the intermediate links.

In practice we are of necessity driven to provisional methods and opinions. What we act upon to-day, with a definite belief as to its reason, we may discard or adhere to to-morrow, but the only thing that can save us from hopeless vacillation and drifting is a view and a plan broad enough to meet the facts as they develop. Clinical observation almost always precedes demonstration. Trousseau, as a heresy based upon his matchless observation, pronounced against venesection in apoplexy. Within a year important reasons for his conclusion have become a matter of demonstration. So it is that the clinical interpretation of experience is good or bad according to its quality as a generalization, and hence it is that we are justified, indeed called upon, to group into tangible relations the palpable facts of importance and adopt a course of action in reference to them.

This brings us to a consideration of the importance of our view from a therapeutic stand-point. Let us admit, that if all our inference and suspicion be correct, yet we have no knowledge of the specific material in question, and hence are quite in the dark as to its formation or prevention.

That the road to a full understanding of all this is tedious is of course true. It will be long before we know. Meanwhile, it is incumbent upon us to have some basis of action, and again we are driven back upon experience.

So far as the acute attack is concerned, it is clear enough what to do. Rest, starvation, and bowel disinfection are the cardinal points and beyond question a necessity. This has been discussed

in a previous paper. By far the most important point, however, is the diagnosis of the morbid tendency and its correction. Experience shows that these conditions recur. We have assumed, if you choose, that the recurrence is a menace. How can we meet the necessities?

At no point in the therapeutics of digestion do we encounter a more important problem. It is true that much of the experience in this territory is in connection with cases that have no considerable digestive complaint. The process and the product are often unnoticed. It would be impossible, if I knew them, to enumerate all the causes of gastro-intestinal malfeasance that pertain to this subject.

The general fact of greatest importance is surplus intestinal contents. That this is not always true I am inclined to believe, for specific food problems do arise, yet the fact that stands out most clearly in my mind is the excess of ingesta beyond the disposing capacity of the digestive apparatus.

Two facts are opposed to this: (1) The acute explosive attacks have all the characterizations of specific poison; and (2) almost all people have markedly excessive ingesta, and the minority show this reaction. This I recognize and none the less I adhere to my view, again invoking experience. A judicious and strictly quantitatively limited diet is the best remedy, and without it I have found no help.

How to harmonize the above objections I do not know, for it involves pure hypothesis, which is interesting but not especially instructive. But of the fact I am satisfied, that limited quantity of food is indispensable.

This, however, is not all. The organism that has gone on in vicious ways has established many defects and limitations. The whole question of reinforcement of normal digestion of a proper amount of food is before us. It is not simple. No problem is likely to be more intricate. In general, it may be said that the causes of indigestion are, as a rule, remote from the digestive tract. Of these established toxemia and defective innervation are the chief.

The achievement of thorough elimination and the re-establishment of nervous balance are what we seek. It is as important at this point as in any digestive trouble we meet.

In all cases this is the desideratum. How we proceed depends upon the preponderance of vice in the case. If nervous exhaustion is the picture, the key-note may be rest; if the stagnation of seden-

tary habit, and its attendant toxemia, work, physical work; if fatigue and toxemia, a combination of rest and selected work.

The detail of this management is as various as the cases, but the principles are uniform. Few of these patients can be satisfactorily adjusted without this feature of some sort of physical exertion.

This is not the occasion to take up a discussion of the quantitative needs of an individual as to food. There is, however, a field of the very greatest importance, bearing upon all bodily degenerations and very strongly upon this question of kidney disease.

We are in the habit of speaking of clean bowel and unclean bowel. Just how we should define these states is not easy to say. It is perfectly clear, however, to all experienced observers that there is clinically a vast difference between these states which we thus imperfectly describe. In the endeavor to maintain a normal and wholesome bowel state, in addition to all other means which we employ, the indispensable factor is a properly limited amount of food. With this as a foundation, almost anything in the way of correction of intestinal vice can be accomplished. It needs no reiteration to make it clear that it is my impression that the crux of therapeutics lies here.

THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS

A CLINICAL LECTURE DELIVERED AT THE NEW YORK POLYCLINIC HOSPITAL AND
SCHOOL FOR GRADUATES IN MEDICINE

BY JAMES J. WALSH, M.D., PH.D.

Lecturer on General Medicine at the New York Polyclinic, etc.

GENTLEMEN: In the development of the methods of physical diagnosis of the lungs which came during the latter half of the nineteenth century, some very interesting details of diagnosis were observed. Among them such refinements as Wintrich's and Gerhardt's change of note, when percussion is made over a cavity under the varying circumstances of closed or open mouth and alterations in position, were the most interesting. You may remember that Wintrich pointed out that cavities in the lung usually communicate with a bronchus. The size of the air-chamber by which the tympanitic note is produced on percussion may be modified when the mouth is opened as compared to when it is closed. There is a higher pitched tympany when there is thus a free communication with the outer air than when the mouth is closed. Occasionally this change of note is not observed when the patient is lying down, because the secretion present in the cavity partially or completely occludes the opening into the bronchus, and thus, notwithstanding the fact that the mouth is opened, the cavity is closed and not open. This will, of course, give more of the low note of the drum than will the open cavity. This phenomenon pointed out by Wintrich is sometimes spoken of as Wintrich's interrupted change of note.

It is rather easy to illustrate this change of note by percussing over the larynx, that is, putting the finger to be struck upon the thyroid cartilage in the neck and opening and closing the mouth while percussion is done. In a somewhat modified form it can be illustrated by percussion over the cheek with the mouth open and shut.

Gerhardt's change of note occurred only in a cavity of unequal diameters and partially filled with fluid. When the patient is sitting up or standing, the presence of the fluid leaves a cavity of

one shape in the lung, while when the patient is lying down the influence of gravity causes the fluid to assume another position, modifying the shape of the space in which the air is contained, and on this, as is easy to see, depends the note that will be obtained by percussion. The percussion note of a cavity is lower when the longer diameter is horizontal, and is higher when it is vertical. Every cavity, of course, does not furnish the conditions for these interesting refinements of physical diagnosis.

As a matter of fact, we are apt to find these developments of pulmonary diagnostic methods rather amusing than seriously significant at the present time. When a patient has reached the stage of cavity formation in tuberculosis, it avails very little to know the shape of the cavity, the presence of fluid in it, or its amount. The diagnosis of tuberculosis and the successful treatment of it depend not on any such refinements, though they have in the past proved a nightmare to many anxious students of physical diagnosis who feared that they would never be able to acquire the expert skill required for the detection of such minute differences in pitch of note, and could scarcely even remember the German names of the inventors of these refinements of diagnosis which have been unfortunately used to designate them.

At the present time, the idea in the diagnosis of pulmonary tuberculosis is to recognize the disease as early as possible in its course. There used to be a good deal said about the pretubercular stage of tuberculosis of the lungs. Of late years we have heard much less of this because it has come to be recognized that tuberculosis may exist for a considerable period before there are any easily obtainable physical signs in the lungs, and that therefore the word pretubercular is not true in the proper sense if it means to infer that tuberculosis may be recognized before the tubercular process really begins. In the so-called pretubercular stage patients are already suffering from true tuberculosis, as a rule.

Many conditions must co-operate in order that physical signs may be obtained in the lungs. A difference in the percussion note can only be recognized if the tuberculous lesion be near the surface, and if it be of sufficient size so that percussion makes its presence recognizable. Professor Virchow's assistant in pathology showed by a series of demonstrations on the cadaver, the conditions for percussion on the dead body being exactly the same as those in the

living subject, that until a tuberculous lesion reached the size of a large cherry it cannot be detected even by the most careful percussion. Even then it is necessary that the lesion should be close to the surface of the lung.

Fortunately, as far as regards physical diagnosis at least, tuberculous lesions are usually, though by no means necessarily, primary at the ends of bronchi and in the air vesicles. Consequently, they are, as a rule, open to recognition by physical diagnostic methods very early in the progress of the disease. If the tuberculosis, instead of being thoroughly localized in a single focus, as is usually the case, is somewhat diffuse and affects the mucous membrane of a number of bronchi, then the recognition by percussion may be delayed until considerable progress in the spread of the disease has been made. In older persons, especially those in whom tuberculosis is secondary to a previous chronic bronchitis, this diffusion of the tuberculous process along the bronchi is not so infrequent as has been thought. Percussion therefore cannot be depended upon with any assurance for the recognition of tuberculosis of the lungs at an early stage.

With regard to auscultation there is more encouragement for the physical diagnostician. It must be remembered, however, that not roughened expiration and surely not the presence of râles are to be considered as initial signs of the presence of pulmonary tuberculosis. Any prolongation of the expiration that is limited to a special area of the lungs must be taken as an evidence of infiltration of the pulmonary tissues, and this infiltration can only be due to one of the infectious granulomas, tuberculosis, syphilis, or actinomycosis. As syphilis and actinomycosis of the lung are extremely rare compared to tuberculosis, the infiltration will usually be due to a tuberculous process.

Before auscultation is of service in the diagnosis of beginning pulmonary tuberculosis, inspection may prove helpful. This is not generally realized, because, as a rule, patients are not sufficiently undressed when an examination of their lungs is made. It is not an unusual thing to find that an affected lung lags distinctly behind the healthy lung in expansion at a very early stage of pulmonary tuberculosis. The reason for this has come to be much better understood of late years than it was before. One of the first parts of the protective mechanism which nature employs in

order to prevent the spread of pulmonary tuberculosis is the limitation of the excursions of the diaphragm on the affected side.

In a word, nature attempts to put the diseased lung to a certain extent at rest. The other lung is asked to do additional work, and a difference in the expansion of the two sides is often not difficult to detect. The limitation of the excursions of the diaphragm on the affected side can be recognized in other ways, and has now for a considerable period been employed as one of the methods of diagnosing incipient tuberculosis. Experts in the diagnosis of tuberculosis make it a common custom to percuss the lower border of the lungs of the back, in cases of suspected tuberculosis, and to map out the extent of expansion which can be determined by the descent of the resonant note below the upper border of dulness during the movement of inspiration.

In recent years it has been found that the excursions of the diaphragm become visible with the aid of the Roentgen rays. Very early in practically all cases of pulmonary tuberculosis, even though the disease affect only the apex of the lung, the excursion of the diaphragm on the affected side becomes distinctly limited. This constitutes in fact the only positive sign that can be obtained by the aid of the Roentgen rays for the early diagnosis of pulmonary tuberculosis. It is only in advanced cases that any infiltration of the pulmonary tissue can be observed by means of the x-rays, and their employment is practically of no more benefit than the use of the method of percussing the lower border of pulmonary resonance and its descent during inspiration, of which I spoke to you a moment ago.

A few years ago, Dr. Litten, of Berlin, pointed out that in suitable subjects and in a favorable light the movements of the diaphragm can be seen with help of the naked eye alone. If the patient be spare of build, with the muscles not too well developed and the chest and upper part of the abdomen laid bare, the feet pointing toward the source of light, which must be abundant, care being taken, however, that there are no cross lights, the movements of the diaphragm can be seen rather easily. This is what is known as the Litten phenomenon. A shadow is seen to travel up and down the side of the thorax in the midaxillary line, or a little bit anterior to it, that is quite distinct, and represents exactly the peeling of the diaphragm from the costal tissues during expiration and the laying of itself against the wall of the thorax again during inspiration.

The Litten phenomenon may be especially seen then in those thin persons who are most likely to have beginning consumption. The observation of the excursions of the diaphragm and the comparison of the two sides may furnish very valuable information with regard to beginning consumption. The limitation of the excursions of the diaphragm on one side points very clearly to the existence of some reflex acting through the phrenic nerve, and, as nature's habit is to put an affected lung at rest, this symptom has a special significance. This method of diagnosis gives us much information without the necessity for the expensive apparatus or the possible danger of burns that is involved in the use of the Roentgen rays.

There are, however, even earlier symptoms of the presence of a localized area of chronic inflammation within the body than even the evidence that may be obtained from the limitation of the movements of the diaphragm on one side. It is well known now that, while the presence of tubercle bacilli in pure culture in the tissues does not always produce a febrile temperature, it very seldom fails to produce a distinct acceleration of the pulse. Cold abscesses may exist for many years without giving any sign of their presence which may be detected by the thermometer. As a matter of fact, it is not until secondary infection has taken place, as a rule, that a febrile movement is noticed associated with the development of tuberculosis.

It is generally recognized, however, that the growth of tubercle bacilli even in pure culture causes an increased rapidity of the pulse. In suspected cases, then, patients should be asked to keep a record of their pulse as taken at least three times a day, and this should be submitted to the doctor for inspection at the end of each three or four days. If, for a good part of the day, the pulse is habitually above 90, then there is every reason to suspect that an inflammatory process of low grade, and this will usually be due to tuberculosis, is running its course somewhere in the body. Of course, care must be exercised in eliminating such cases as have a family tendency to rapid pulse, or those in whom a run-down condition for some definitely known reason makes rapidity of the pulse possible, without appealing to the presence of tubercle bacilli in the tissues.

While the early development of tuberculosis does not always produce a definite rise of temperature, some modification of the normal temperature range is not nearly so unusual as might be

imagined from the superficial examination of this subject that physicians only too often make. A thermometer is placed in the patient's mouth, and if the temperature is 99° F. or only slightly above that it is considered to be normal. Some questions may be asked as to a tired feeling in the afternoon, or a hectic flush that indicates the postmeridional rise of temperature, and if these are answered in the negative, the patient is considered to have no febrile movement.

As a matter of fact, while 98.4° F. is the average normal temperature, many individuals in perfect health have a temperature whose daily average is considerably lower than this standard. There is a normal physiologic temperature range of about one and one-half degrees during the 24 hours. The lowest temperature in a normal individual of ordinary habits of life occurs in the early morning hours, usually between 4 and 6 A.M., and is often below 97° F. A series of observations made in Germany in the laboratory of Professor Brieger, and in connection with the out-patient service of his department at the Charité Hospital, showed that the majority of patients who had no affection to disturb their temperature had a morning temperature (that is about 10 A.M.) of 97° to 97.4° F. Most of these persons in the afternoon had a temperature of 98° to 98.2° F. when in health.

It is evident from these observations that for many of these persons an afternoon temperature of 99° F. or slightly higher would indicate that there was some inflammatory process at work, causing a distinct febrile rise of temperature. As a matter of fact, there is no absolute standard by which, from a few scattered observations, it is possible to decide that a patient is not running a temperature. The only sure and accurate method of making such a decision is to have the patient's temperature taken three or four times a day for several days and then study the record of it. If patients are running a range of temperature more than one and one-half degrees in the 24 hours, and one of the observations should be taken at least as early as 7 A.M., then there is reason to suspect that some morbid process is at work. Needless to say this morbid process can usually only be tuberculosis, and the most usual localization of the tubercle bacilli is in the lungs.

After the pulse and the temperature, the most important easily recognizable sign of beginning tuberculosis, and one that with care

can be recognized before physical diagnosis methods will show any definite lesions of the lungs, is loss of weight. Weight is an eminently individual characteristic, and may differ considerably even in healthy individuals of the same habits of life. As is well known, it depends mainly on heredity, racial and family characteristics, and the circumstances of individual occupation. There is a definite normal weight, however, at about which every individual should maintain himself, if he is to retain good health. Any notable departure from this is a sign of some morbid process at work.

The individual weight is one of the most important elements for the recognition of the condition of the general health, and yet it is very often neglected by patients. This is especially true with regard to children. Mothers will come and give infinite details of the child's subjective symptoms, of its peculiarities as to picking the nose, snoring, restlessness during the day and at night, lassitude, capriciousness of appetite, and all that, but when asked has the child lost in weight, will usually be unable to tell. Every individual should know his normal weight, and when overworking, or especially exposed to conditions that may cause deterioration of health, should watch it regularly so as to determine without delay any distinct loss of weight that may occur.

Children should be taught the habit from early life of knowing their weight and of taking it regularly. Toward the end of the school year, when overwork and anxiety because of examinations are apt to do so much harm to delicate children, there is no easier or less fallible criterion of the condition of their health than their weight. Growing children should constantly be increasing in weight, and their mothers should know what their weight is from week to week, if they are really interested in the child's health. This is especially true for children who are growing rapidly; and as soon as there is a failure to increase regularly in weight, it should be considered as a danger-signal, and the child should be made to take more rest, and should be tempted to eat, especially of the more nutritious foods, and if there is not prompt gain in weight under the new conditions, should be taken away from school.

In adults, loss of weight is a danger-signal that must not be neglected. If people are normally under weight, that is, if they are more than ten pounds below the average weight that persons of their height should have, then especially is any loss of weight

likely to be significant of the beginning of some chronic inflammatory process. The main part of the predisposition to tuberculosis is probably included in the tendency in certain families to be under weight. One of the largest of our American insurance companies has accepted this fact as a standard by which to judge of the insurability of its risks, especially for large sums, when there is some question of a family tendency to tuberculosis.

After a careful investigation of its statistics of death for many years, this large insurance company decided that it was more liable to loss by the assumption of risks on lives of individuals who were under weight than on those who had tuberculous heredity. A man twenty pounds under weight was found to be more likely to die of tuberculosis, even though he had no family history of tuberculosis, than another who was fully up to the average weight and with a family history of tuberculosis on both sides of the house. As a matter of fact, we realize now that it is not heredity that counts in tuberculosis, but contagion. A man whose father and mother had both died of tuberculosis, but who is up to the standard of weight and is now living out of contact with tuberculous patients, is not at all likely to suffer from the disease.

It is not so difficult to understand this matter of loss of weight and the growth of the tubercle bacilli, if we recall some of the recent observations on the morphology and chemical constitution of the tubercle bacillus. Chemical analysis of the bodies of tubercle bacilli when grown in large quantities for this purpose show that more than one-half of the material of which they are made up is a substance somewhat resembling fat and considered to be derived from fat. In order to obtain its nutrition then and grow rapidly, the tubercle bacillus must be placed in circumstances in which it is able to obtain a fully supply of fat without stint or delay. The circumstances most favorable, then, for the growth of the tubercle bacilli are just those in which the individual human host is losing weight.

At this time fat is being taken up by the blood and lymph streams from the fatty materials previously deposited in the tissues and is being carried in the venous blood through the lungs before being consumed for purposes of heat production when it comes in contact with the oxygen of the air in the lungs. At such times the tubercle bacillus finds an abundance of fatty material out of which to elaborate the material of which it is mainly composed. If, on

the contrary, the individual is gaining in weight, then there is comparatively very little fat finding its way into the blood on its way to the lungs, and it is in a form that is less available for the purposes of the tubercle bacilli. It is well known that as soon as tuberculous patients begin to gain in weight, there is a lessening of the tendency for the tuberculous process in the lung to spread and a diminution of the number of tubercle bacilli to be found in the sputum.

This question of the weight of the individual then becomes a very important matter, on which from the very nature of the tubercle bacilli the development of tuberculosis depends. If there is a story of loss of weight with a cough in an individual already under weight, this is of itself sufficient justification for the diagnosis of beginning tuberculosis, even though there may be no tubercle bacilli in the sputum, or, in fact, no expectoration at all, and even though the signs in the lungs may be only suspicious and not especially definite.

It is important to warn individuals who have had some suspicious signs of tuberculosis earlier in life not to take up obesity cures without the careful supervision of a physician. It is now well understood that tubercle bacilli may remain dormant in the tissues, shut in by nature's curative process of connective-tissue formation, for many years without producing any symptom of their presence. This is not so unusual a biological fact when we remember that typhoid bacilli may remain perfectly latent in the tissues for 10 to 15 years (in one case I believe 18 years) before setting up an osteomyelitis following trauma, in the pus of which, however, typhoid bacilli were found in absolutely pure culture. Many persons suffer from a prolonged cough, with expectoration and some loss of weight, in early adult life, and then become thoroughly well and are apparently in no danger. The old people used to say that such young persons were threatened with a decline.

When there is a history of such a condition in the patient's life, then it is always possible that there are tubercle bacilli lying dormant in some part of the tissues. If children have suffered from enlarged glands, it is not unlikely that some of the bronchial glands were also enlarged at the same time, and that tubercle bacilli may be hidden away in them. Any great loss in weight, then, is apt to cause an activity in the unstable connective tissue that sur-

rounds old tuberculous lesions, with the consequent absorption of tuberculous material into the circulation. There is always danger, then, of any rapid loss of weight in such persons. If they are to go through an obesity cure, there must be no rapid diminution in weight, or tubercle bacilli find a favorable opportunity for multiplication.

In this regard, it is well to remember the German expression with regard to the wide-spread prevalence of tuberculosis; "Wir sind alle am Ende ein bischen tuberkulös," "After all, we are all of us a little tuberculous." Careful examination of the bodies of patients dying from diseases other than tuberculosis in the General Hospital of Vienna shows that considerably more than half of such patients have healed lesions of tuberculosis in their lungs. Any one who has seen many autopsies made knows that it is exceptional not to find some puckering and adhesions of the lungs at one of the apices. There is then for most persons a considerable danger in rapid running down in weight, since they may infect themselves from an old not fully healed lesion of tuberculosis.

I know myself of two cases in which rapid diminution in weight—the consequence in one case of a too rigorous obesity cure, and in the other of an antifat remedy containing a considerable amount of potassium iodid, was followed within a few months by a rapidly developing and eventually fatal form of tuberculosis. There may have been no direct connection between the loss in weight occasioned by the obesity cure and the antifat régime, but it always appealed to me as a something to be taken as a warning in such matters. As Professor von Noorden, one of the best authorities in diseases of metabolism, in a recent work on the reduction of obesity, has insisted on the fact that when rapid diminution of weight is brought on by remedial measures, fat is lost mainly from the arm, the bust, and the leg rather than from the abdominal wall and the mesenteric collection of fat. Fat tissues in the latter locations are less provided with blood-vessels, and consequently are reabsorbed less readily, while it is exactly from these regions that the ordinary patient wants the fat to disappear. It is clear, then, that rapid reduction in weight that is more than a pound a week should never be permitted.

Cough is a prominent symptom of tuberculosis, and its persistence beyond ten days to two weeks under ordinary treatment should always prove a suspicious sign. Where cough persists and

has a distinct tendency to recur, some explanation of it in a chronic condition should be forthcoming. Apart from tuberculosis, the most frequent causes of chronic cough are some emphysema associated, as it usually is, with chronic bronchitis and a mitral regurgitation that by causing congestion of the lungs gives a tendency to lowered vital resistance of pulmonary tissues, and consequently to the frequent catching of cold, with subsequent difficulty in throwing off the infective agents at work in the bronchi.

Where emphysema exists and a tendency to chronic bronchitis, it must not be forgotten that tubercle bacilli may find in the tissues affected by chronic bronchitis a favorable nidus for growth. As a rule, however, tuberculosis runs a rather slow course in patients affected with these conditions. The reason seems to be that there is already present in the lungs of such persons a distinct tendency to the formation of connective tissue on very slight provocation. This enables the lungs rather easily to defend themselves against the invasion of tuberculosis. The bronchial mucous membrane becomes affected, but the infection does not spread deeply into the pulmonary tissues.

It must not be forgotten, however, that such patients may prove a very active source of contagion, and may spread the disease under circumstances where it is difficult to recognize the source of infection. Professor Landouzy, of Paris, tells the story of a young married couple whose first boy, in the midst of excellent health, at the age of one year was taken with the preliminary symptoms of tuberculous meningitis. This ran the usually fatal course. Neither father nor mother had any tuberculous history and the source of the infection seemed a mystery. Two years later another child at the age of eight months became affected in the same way with the same fatal result. Then a careful investigation of the conditions surrounding the children was made. It was found that their nurse was an old woman who had been the nurse of their mother, and who was very affectionate in handling the children. She had suffered for many years from cough, which affected her, however, only in the early morning as a rule, and which had never caused any serious deterioration of the general health. In the expectoration, however, tubercle bacilli were found, and there seemed to be no doubt that this was the origin of the tuberculous infection of the children.

These cases illustrate what to my mind is the most important point for the early diagnosis of pulmonary tuberculosis, which consists in ascertaining from the patient's history whether there is any possibility of contagion from the persons with whom he or she is intimately associated. In this regard, it must not be forgotten that certain occupations leave the patient particularly liable to tuberculosis. Among women, for instance, laundresses have been shown by English statistics to be more than twice as liable to consumption as working-women of the same class in other occupations. Scrub-women who have to scrub public halls and offices where men are liable to expectorate freely are also more liable than others to contract tuberculosis.

Men who work in factories, especially in crowded tailor-shops in tenement house districts, are very prone to tuberculosis partly because of the inactivity of their lives, their general low nutrition, and poor ventilation of such places. The greatest danger consists in the likelihood that one or more of a number of men will suffer from tuberculosis and be careless in their habits of expectoration. Working-women under the same circumstances are not so liable to contagion because of the greater cleanliness of the women and their freedom from the unhygienic habit of expectoration.

If a patient suffering with even a slight though persistent cough has a slight rise of temperature and an increase in the rapidity of the pulse with some loss of weight, and there are any circumstances in the environment that point to the possibility of tuberculous contagion, it is only fair to assume that the affection under treatment is tuberculosis, even though there may be no bacilli in the sputum and the physical signs of the lungs may be so slight as to be scarcely more than suspicious.

The earliest possible diagnosis of tuberculosis, then, depends not on the discovery of any one significant symptom, nor on the recognition of a pathognomonic set of physical signs, but on a study of the actual conditions of the individual patient. In doubtful cases, when physical signs are lacking, yet there is good reason for the suspicion of the presence of tuberculosis, the pulse and temperature record as taken at least three times a day for three or four days, and the weight record for the past month or more, if it is available, should be in the physician's hands. Besides all this, the environment of the patient, and especially his surroundings

during his daily occupation, should be carefully searched for any possible source of tuberculous contagion. Only when all the information obtainable from these is negative is the physician justified in pronouncing definitely that no tuberculosis is present.

Nearly one-half of the patients who are untimely cut off by tuberculosis were told by some physician or other at the beginning of their illness that they did not have tuberculosis. Nothing could well be more dangerous than a mistake of this kind. A physician who depends on physical signs as the only pathognomonic symptoms of tuberculosis will often miss the very incipient cases in which therapeutics is most hopeful. The question as to whether the patient himself should be told or not remains as yet under discussion, but there are fewer and fewer advocates, as the years go by, of the old secretive system that counselled concealment of the patient's true condition in order not to do harm and depress by the shock of the announcement.

It has been well said that the hopeful treatment of incipient tuberculosis of the lungs absolutely requires the intelligent co-operation and the constant assistance of the patient himself. This, more than any other therapeutic factor, must be secured if success is to be looked for. When, then, there are any of the physical signs that I have mentioned, a distinct tendency to rapidity of pulse at certain times during the day, a daily range of temperature in excess of a degree and a half, a loss of weight for which there is no good reason, especially if combined with the tendency to cough, even though there may be no expectoration, the patient should frankly be taken into the confidence of the physician, and the possibility of his being infected with tuberculosis be put before him.

Under these circumstances, as a rule, it will not be difficult to persuade even the most obstinate of the necessity for care in their daily lives in the avoidance of all possibilities of contagion from others, or of reinfection of themselves, and of the necessity for avoiding excesses in work as well as in amusements, eating, and drinking, and the like. Such patients will usually take up the régime counselled by the physician and will regulate their daily lives for a time according to his wishes until their physical condition has improved. There is in this matter of the very early diagnosis of tuberculosis and its treatment a large and encouraging field in which almost untold suffering and many lives can be saved.

Surgery

ANGIOMA AND ITS TREATMENT

BY CARL BECK, M.D.

Professor of Surgery and Surgical Pathology in the Post-Graduate Medical School, and in the Medical Department of the University of Illinois (College of Physicians and Surgeons), Chicago, Illinois

ANGIOMA is a tumor of blood-vessels. This definition excludes all forms of enlargement of blood-vessels that are not strictly tumors, such as aneurisms, passive dilatation, etc. There has been more confusion of terms and lack of precision in nomenclature in this group of tumors than in any other, and to this day an old and not strictly logical division is made of the different forms of angiomas into simple *nævi*, cavernous *nævi*, and plexiform *nævi*, although such a division is not borne out by actual differences. There are three kinds of blood-vessels: arteries, capillaries, and veins, and no tissue can have but one kind of vessel; consequently the angioma cannot be composed entirely of one kind of vessel only. However, the predominance of one kind of vessel has led to these subdivisions; to some degree they are of practical value in regard to the treatment. Entirely illogical is the subdivision cavernous, as the formation of blood cavernæ, namely, cavities of intercommunicating vessels, is a process of regressive change analogous to the formation of cavernæ in a goiter or adenoma. It may occur in arteries as well as veins, and may be observed in the so-called plexiform or cirroid angioma as well as in the capillary. In their energy of growth the blood-vessel walls press each other until pressure atrophy removes the wall and the blood-vessels communicate in the shape of cavities or large blood cysts, or aneurismatous arteries and veins.

Angioma will therefore be divided into arterial, venous, and capillary. The latter form is the one which has its seat pre-eminently in the skin, and has been named *nævus*, port-wine mark, etc. Its color is due to the varying preponderance of arterial or venous

vessels, and consequently it appears bright red or bluish, or of mixed color. The two other kinds are subcutaneous, as a rule; they may, however, by pressure atrophy, reduce the epidermis to such a fine membrane that the vessels or blood spaces are seen distinctly under the surface. Between the flat superficial capillary angioma and the tumor mass composed of irregular vessels and vessel spaces there are all combinations and varieties possible, and in describing and naming the individual case it remains only to name the predominant feature. The angioma may be combined with other growths, but the fibrous and especially fatty tumors are often associated with them.

The pathologic feature of the tumors is that the vessels are not normal in their make-up; their walls are not composed of equal and adequate tissue; the veins are thicker in some portions and thinner in others, often laterally anastomotic; arteries also often enlarge aneurismal-like, spindle- and sac-shaped. The blood rushing through them must produce an irregular current, causing noises which are a symptom of some of those tumors. The erectility of some angiomas is also the result of this irregular current; the reflux does not occur with the same promptness as in physiologic normal vessels, and stasis or erection is the result. The disturbances of equilibrium produce characteristic symptoms.

The locality of the growth also has an influence upon the symptoms. Upon a hard basis like the skull these fluctuations of current cause a very painful and destructive process of pressure atrophy, while in the soft muscular tissue it will often be without such manifestation. A venous subcutaneous angioma often causes only a deformity, but a cutaneous venous angioma may be fatal by a hemorrhage. Thus the symptoms vary considerably.

Their etiology is an interesting study. They all have one common feature, that is, they have existed from childhood, possibly from birth; hence the term birth-mark. A red point, with a few radiary vessels, is often seen on individuals, particularly in children on a characteristic place below the eye about the line between the cheek and eyelid. I have seen it in many instances. I have often been asked to remove it, and did so with electricity. In some families many members have this characteristic mark. It seems to be the slightest degree of angioma. In most cases such small points remain unchanged; in others they grow slowly or rapidly

in extent and in depth, often irregularly, but very frequently in regular zones, and in many instances are entirely limited to one side. Figures 1 and 2 illustrate an angioma extending over the whole half of the body in front and behind, involving the head, trunk, and extremities. I have been asked to improve the looks of this woman, and have tried it by removal of the capillary angioma, and by Thiersch grafts of the forehead and face. The result was not very encouraging, inasmuch as the angiomatous character of the growth showed itself in the grafts to a certain degree, so that the good looks after the operation were marred by a recurrence.

If we ask ourselves why these angiomas are so particularly lateral or symmetrical, it seems to me that this must have some relation to the embryologic development or to the nerves; maybe in the same sense as the "head zones" determine certain neurologic conditions of the body.

While studying the formation of a symmetrical lipoma, some ten years ago,¹ I dissected a number of embryos and young infants with especial reference to the division and distribution of fat and veins on the surface of the body, and I noticed that those flat bunches of fat, with their vessels, had a typical symmetrical location; that their pathologic appearance in the shape of a lipoma, a symmetrical lipoma or an angioma, is an indication of these localities. That they may be the result of trophic changes seemed to me then very probable; but other observers also have noticed this feature, and the term "Nervenangiom" (angioma neuropathicum, Kaposi) indicates this opinion. Virchow seemed inclined to take them for results of faulty closure of the natural clefts, hence he called them fissural angioma, but the location in embryologic fissures does not seem to be the rule.

The most important and most interesting study, however, is the treatment. The indications for the treatment may be twofold: (1) The cosmetic. (2) The symptomatic. A historic review of the treatment of angioma would reveal the fact that almost every known remedy which has been in use in the general treatment of tumors has been tried for angioma. The results have been very different. In regard to cosmetic improvement, one must admit that a great deal

¹ Multiple Symmetrical Lipomata: A Trophoneurosis, Chicago Medical Recorder, 1892, vol. iii, p. 96.

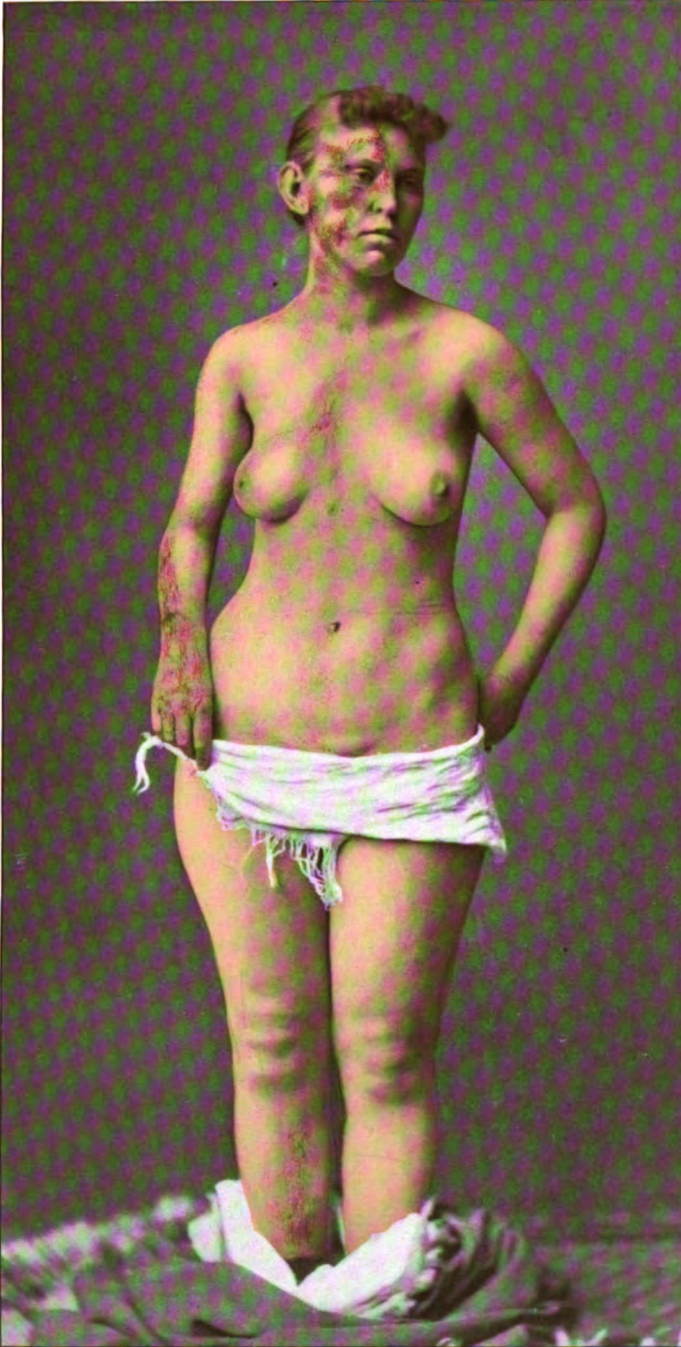


FIG. 1.—Symmetrical capillary angioma (Case IV). The face, neck, breast, arm, and leg of the right side are covered by a wine mark. On some portions it is more bluish, on others bright red, but most pronounced on the face and arm.

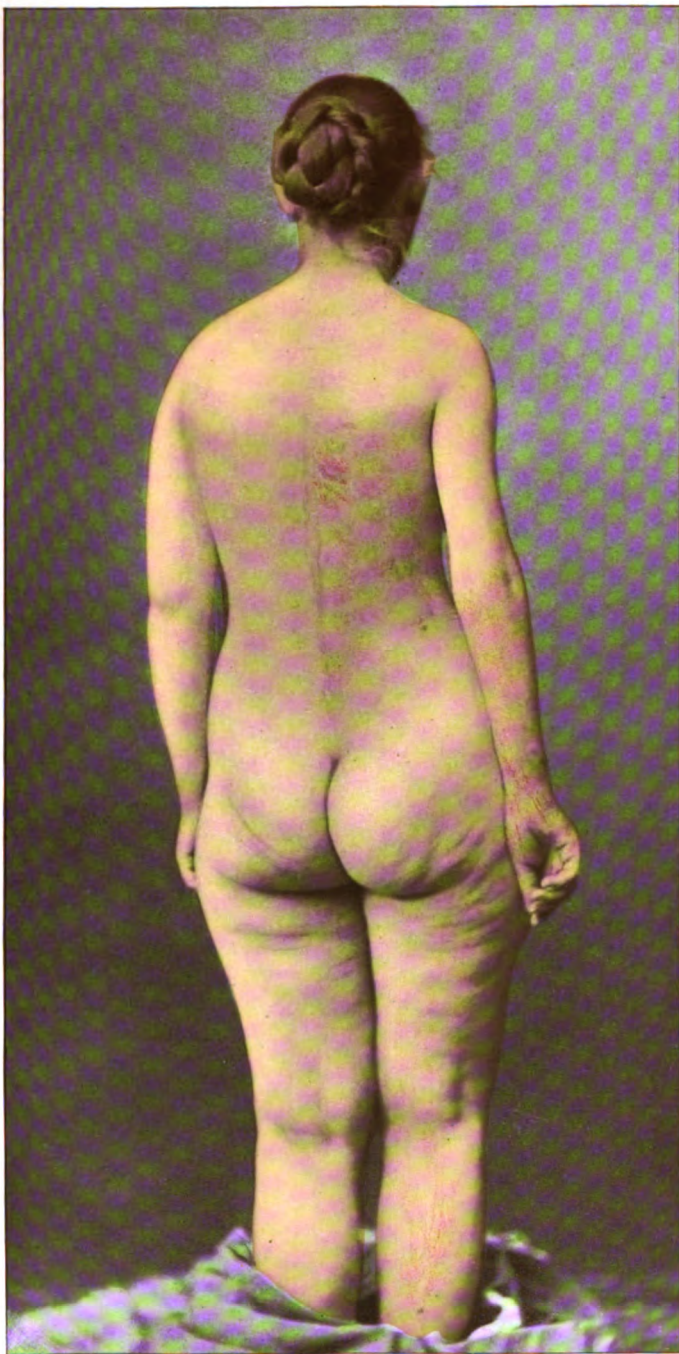


FIG. 2.—Rear view of Case IV. The chest and arm are most affected, but the capillary enlargement extends over the whole half of the body.

is yet to be desired. Especially must this be said of extensive capillary angioma, which is attacked by professional and other cosmeticians, and results often in a more unsightly and repulsive scar than the equally red color of the capillary angioma. Something else, however, is to be said of the causal symptomatic indication for pain, hemorrhage, and pressure atrophy. Here we have splendid results, some of them very gratifying, because it is difficult to obtain results. I shall not go into the historical review of the methods employed, but I shall discuss some of them as their dignity and value as such have appeared to me. To be just, one must not be fond of one method and hobby, but must especially in this class of cases individualize.

(1) Compression, as recommended by the old authors, Boyer, Dupuytren, Broca, Abernethy, etc., with a special apparatus or compression with collodion, is useless unless it happens that compression causes gangrene and then cicatrization. I have used compression, both with a special clamp and with collodion, a sufficient time to test its value. In Case VI it had proved absolutely useless, and if any case was favorable for this treatment, it was this particular case.

(2) The permanent compression in the form of a ligature, either of the arterial blood supply, the large vessels, or the ligature *en masse* of the tumor. This method is certainly very useful, if not to produce a cure, to prepare for the ideal cure by excision. Modifying the percutaneous suture, I have developed a method of my own. It has proved to me very expedient in almost every case, and I have gradually learned to use this old method in a manner to prepare the tumors for a radical cure. The ligature has been recommended, first, by Harvey (1651), Ambroise Paré, and as a so-called precautionary ligature *en masse* it has been in use for a century (Manec, Ferguson), but it produces gangrene if executed in the ordinary manner, and then healing by a very slow process of granulation. If this gangrene is to be obviated, the circulation must not be shut off entirely, and the method to do this is not to try to do the operation in one, but in many, sittings,—two to three or more,—according to the size and extent of the tumor. In doing this I have observed a phenomenon which certainly many surgeons have seen and perhaps made use of unconsciously. By drawing tight such subcutaneous ligatures, the tumor is diminished in size and

the healthy surrounding skin is put on a stretch. Gradually, however, this stretched skin grows and becomes larger, the tumor smaller, and we are able to get the tumor small enough so as to excise it without leaving much of a defect; that is, we are able to excise and unite the two borders of the wound and obtain linear union without any tension or necessity for a plastic operation. Had we excised the tumor in its original size, we could never bring about union without a plastic operation, much less a linear scar. I have used this method successfully in Case I. Had I tried to excise the large angiomatic mass of the neck without previous subcutaneous ligature *en masse*, diminution of tumor, and plastic growth of normal skin, I certainly would have produced a cicatricial *caput obstipum*, if I had brought the borders together at all. I also made use of the ligature of the large afferent vessels and ligated in this case the common carotid artery, taking care to excise a portion of it, so that no collateral circulation may form around the ligature. This case proves that such a procedure is not what it is reputed to be, that is, a very dangerous undertaking; in fact, I have not lost a single patient in whom I have used such a ligature, and I have performed the operation quite a number of times.

The object of these ligatures is to produce an obliteration of the blood-vessels and transformation of the vessels into connective tissue, that is, scar tissue. It is the safest method, because we can limit the district, and by using a continuous thread or ligature in a certain zigzag manner, we can shut off the blood supply sufficiently without causing gangrene. Of course, we can hardly expect to remove the growth entirely without leaving behind a more or less irregular mass of connective tissue, unsightly enough to recommend clean excision as a final stroke. It can be made use of easily in cases of venous angioma, arterial angioma, and to a certain degree, I hope, also in the more extensive capillary form. I have not had much experience in the latter form with it, but in the first favorable case I shall give it a trial.

(3) The transformation of the blood-vessels into connective tissue may also be produced by the injection or introduction of all kinds of foreign material, which produce coagulation by their thermal or chemical action. This line of treatment is unreliable because it is not within our power to limit the effect. Once injected, we have to depend upon good luck, and therefore I do not favor it.

I have used some of the methods of this kind, but I prefer not to try them any more. Arnott (1850) recommended the freezing of tumors; Wyeth, hot-water injections; Mosetig-Moorhof, peroxid of hydrogen; Schloffer, in Prague, hot air (apparatus Holländer). Lieblein warmly recommends alcohol injections, which were originally recommended by Karl Schwalbe. He treated a case in Wölfler's clinic for six years, made 402 injections, but he adds that the ligature of the temporal artery was done besides and may have done some good.

A very interesting method is introduced by Payr,¹ who recommends the introduction of magnesium nails into the tumor. These metallic bodies are gradually absorbed, causing coagulation of blood. Their action in producing an obliteration of the vessels is explained by the formation of hydrogen, which is set free by binding the oxygen of water to the magnesium, and thus acting as in the process of electrolysis, coagulating the blood. In small quantities the hydrogen may not be harmful, but in large quantities the same embolism may happen as in the case of injection of H_2O_2 , a very dangerous occurrence (Bert). Injections of other material are obsolete.

(4) A very valuable method of treatment is the treatment with electricity in its different forms. Its use is very old, but modern instruments and clinical observations have improved the methods, so that we may use electricity safely, as electro-puncture and electrolysis. I have used both in a number of cases and have obtained an almost ideal result in Case VI. It required, however, quite a number of operations, all of them done under anesthesia. But the location of the growth left no choice. Any other method, especially excision, would have been a failure from a cosmetic stand-point. The electrolytic effect of one needle produces an anemia around the point of entrance, which lasts for hours and is due to a coagulation of the blood to some extent. If we are careful not to do too much at once we shall avoid a superficial gangrene, which is an essential point in the treatment. The use of electrolysis will remain restricted to a small group of cases, and among them will be the angioma of the tip of the nose (the bulb nose), and perhaps the punctiform capillary angioma underneath the eye. Large capillary

¹ *Zeitschr. f. Chir.*, 1903.

angiomas over the face may be tried, but they will prove tiring to the patient and physician, and the result, as I have said before, is often disappointing.

(5) The last method in vogue, and the best, the only radical one, is the extirpation of the angioma. Here we have to deal with two difficulties, the hemorrhage and the defect. Capillary and venous angiomas do not bleed so freely as the arterial. In fact, the hemorrhage from the latter may be so profuse as to prevent any operation without previous ligation of the afferent arteries. The venous angioma sometimes may be shelled out without ligating one vessel, as Mueller¹ calls it, *Stumpfe Auslösung*, and done with Cooper's scissors without ligation. In fact, it may have a fine capsule, as Ribbert has found. As a rule, however, a few ligatures will allow the removal of a venous angioma, but it may be necessary to use Esmarch's band to attack an arterial tumor. I used this method in Case II, otherwise I should have lost my patient from hemorrhage on the table. The defect produced by the extirpation is a very important factor. Angiomas are usually large in area, and when, after removal, the healthy skin retracts, the loss of substance may be very large. Plastic cover is hard to be obtained to such an extent, and the covering with Thiersch grafts is a failure, as seen in Case IV; consequently the preliminary growing of healthy skin by continuous subcutaneous ligation seems to me a very valuable method to obtain good results. *Excision is to be practised only after all possible cicatrization has been obtained by the subcutaneous ligation.*

In conclusion, I should like to give a brief account of some very interesting cases out of a large number treated.

CASE I.—Child of three months, was referred to me by Dr. Holm. When it was born the parents noticed a red spot on the left cheek below the lid. This increased every day. Large bluish veins and prominent blood-filled spaces began to show, until when three months old the child had an enormous tumor of the face and neck. Almost the entire left cheek, the left side of the nose, the left upper lid and lower lid, and the neck on the same side were transformed into large angiomatous folds, and the neck looked as if it had a collar of a large mass of vessels. The palate and even

¹ Beiträge z. klin. Chir., 1903.



FIG. 3.—A child with a large venous angioma of the face and neck. The dark portions on the cheek, lip, and neck indicate the growth (Case I).



FIG. 4.—Present condition of the child (Case I), $2\frac{1}{4}$ years after operation. The only abnormality is a hard nodule in the right nasolabial fold; otherwise the face is normal. The scars are not very marked.



FIG. 5.—A boy with a large arterial angioma of the penis, scrotum, and perineum (Case II). The tumor is pulsating and bleeds easily. Large vessels are seen on the surface.

the tongue showed evidences of the growth. Two surgeons had been consulted and had pronounced the case a *noli me tangere*. It seemed to me that only a special method would prove of some avail, and I formed the plan of the subcutaneous ligature. (Fig. 3.)

At first I tried silver wire, but inasmuch as it had to be taken out again I substituted silk, which again proved a failure, as it did not heal in, but had to be taken out again. Catgut finally served the purpose. I sutured in eleven sittings different areas with continuous subcutaneous suture, reducing the sutured masses into connective tissue. This was excised afterward. After suturing the different masses, I noticed that the small islands of normal skin between them increased in size; they grew in the same extent as the tumors diminished, and when the connective tissue masses were excised it appeared that the whole area of healthy skin was larger than in the beginning. But inasmuch as the tumor kept on growing, I made a desperate attempt to stop this growth by resection of a portion of the common carotid artery. This helped. From that moment on our subcutaneous ligatures seemed to work much better. When the people, discouraged by the large number of operations, stopped coming, the result seemed very good, and now, two and a half years afterward, the result is perfect. The photograph of the present conditions shows no trace of angioma, and only in the nasolabial fold on the left side is a small mass of connective tissue, which may be excised at any time. This case proves in the best way the efficacy of the method. (Fig. 4.)

CASE II.—R. M. (Fig. 5) was a boy of three years when he came under my observation with an arterial angioma of the penis and scrotum—an enormous amount of arterial vessels supplied by one large pulsating artery, which could be felt in the pelvis by rectal examination, and must have been of the size of a subclavian artery of a child of that same age. The whole region, as seen by the picture, was transformed into an irregular mass of vessels. An attempt to cure this condition had been made a few months previous to this time by the late John B. Hamilton. He tried several percutaneous silver-wire sutures, but a severe hemorrhage followed and almost carried off the patient. The child was very anemic, and had to be nursed for some time before a new attempt of removal was made. I began the operation in the old way of a common resection, not knowing then of the plan of subcutaneous ligature.

Vessel for vessel was tied. Sometimes I tied vessels *en masse*. Nevertheless, a great deal of blood was lost, and when half through with the operation I was glad to be able to throw a rubber ligature around the base of the tumor on the perineum and allow a constriction and sloughing off of the larger portion, giving up a radical resection. The second picture (Fig. 6) shows the child with a large granulating surface in place of the tumor. The constriction with the rubber tubing showed me that I might have obtained a better result had I used constriction before excision; in other words, a subcutaneous ligature. After a few weeks the granulations were well enough to allow a plastic, which is described elsewhere. It was a plastic with flaps and Thiersch grafts, supplied by a number of doctors and nurses of the class of the Post-Graduate Medical School. The final result was fairly good as to function and appearance, as is shown by Fig. 7. The mother never wanted another operation; otherwise I should have ligated the large vessel, which evidently supplied the angioma, and thus should have prevented a recurrence, which I am sure threatens the child for the rest of his life.¹

CASE III.—A large angioma of the tongue. Mr. A. K. consulted me on account of this tumor, which had existed since he was a child, and never caused him much inconvenience. Half of the tongue is transformed, as seen by the picture, into a bluish, pulsating tumor, but inasmuch as it had remained stationary for years, I did not think that treatment was necessary. (Fig. 8.)

CASE IV.—M. Sch., a young girl, consulted me on account of an old red-wine mark on her face, which she wished removed, if possible. On close examination I found that she had a capillary, and on some portions venous, angioma over the right half of her body, front and back, and extending from the forehead to the toes, limited clearly in front and in back by the median line (Figs. 1 and 2). On her arm the condition was that of a venous angioma, while on the rest of the body it appeared a capillary angioma. I formed the plan by which I thought I could improve the looks of the girl. I resected the whole surface of the forehead, extending from the eyebrows to the border of the hair, and after

¹ While correcting the proof, the child's mother brought him to see me after an interval of several years. I found no recurrence, but on the contrary an absolutely satisfactory condition and normal functions.



FIG. 6.—Three weeks after the operation (Case II). The two testicles are seen as round, dark contours upon the granulating surface. The granulations show the extent of the defect before the plastic operation.



FIG. 7.—Result of the plastic operation (Case II). The penis and perineum are covered with epidermis taken from the abdomen, and also by Thiersch grafts.



FIG. 8.—Venous angioma of the tongue, larger when the tongue is put forward and compressed (Case III).

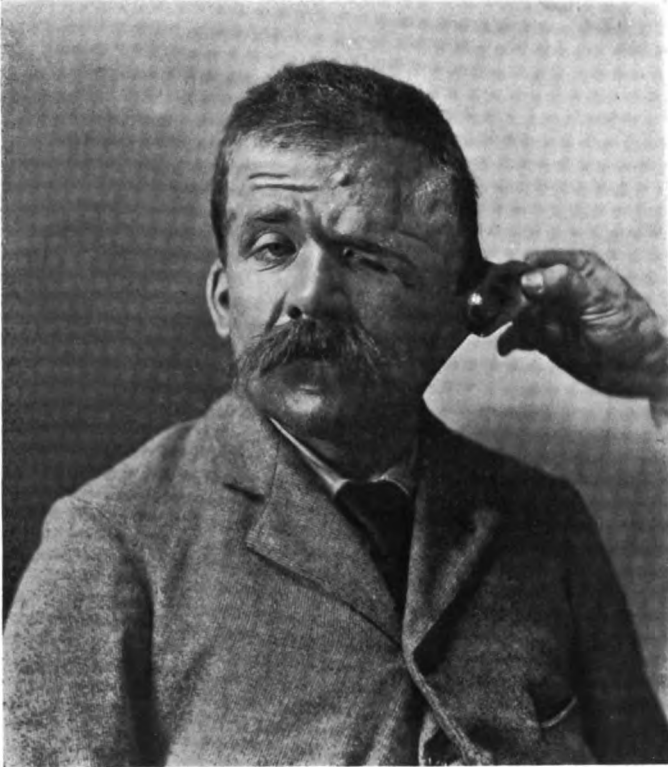


FIG. 9.—Arterial angioma of the temporal region, eyelid, and ear (Case V). The ear especially is affected and very freely movable. The left eye cannot be opened.

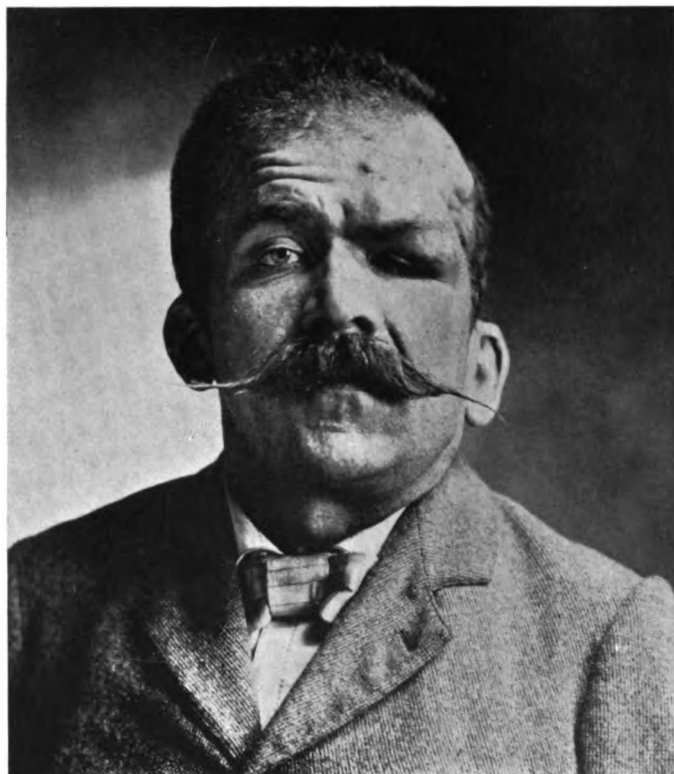


FIG. 10.—Result of the operation (Case V). The temporal region is free; the eyelid can be raised.

stopping carefully the hemorrhage, replaced it by nicely arranged Thiersch grafts. The condition appeared two weeks afterward very favorable; a beautiful white skin was in place of the angioma, but gradually small vessels made their appearance in the grafts, more between the single grafts than within them, and to my sorrow it looked worse than before. Electricity destroyed these cross-marks to a certain degree, but not fully, and I must declare that grafting over a surface of an angioma is a failure.

CASE V.—B. B., a coachman, had been a sufferer from a lump on his left temple since he was a child. This has always had some pulsation, and gradually increased, causing an enlargement of the left ear and eyelid, so that the left eye was entirely covered and could not be opened (Fig. 9). The condition was an arterial angioma of considerable size. At the time when he consulted me he had suffered considerably from headaches and pains in his eye and suppuration from his eye. Nothing but a removal of the tumor and a plastic cover could be done. I used in this case a ligature and excision of the temporal artery, an excision of the whole tumor down to the periosteum, and removal of a portion of the abundant skin. The result of the operation was cosmetically and otherwise absolutely good, as is shown by Fig. 10.

CASE VI.—Child with bulbous nasal angioma venosum. After 10 sittings (in anesthesia) of electrolysis shows excellent result. (Exhibited at the meeting of Chicago Medical Society.)

A CRITICAL REVIEW OF METHODS OF INTESTINAL ANASTOMOSIS, WITH ESPECIAL REFERENCE TO THE CONNELL SUTURE. A REPORT OF FIVE CASES

BY JOHN G. CLARK, M.D.

Professor of Gynecology in the University of Pennsylvania

AND

JOHN W. LUTHER, M.D.

Instructor in Gynecology in the University of Pennsylvania
Philadelphia

It may be stated as an axiom in medicine that the larger the number of remedies the more incurable the disease. If we were to apply this same axiom to surgery, it would appear that the larger the number of operations which have been devised to remedy a given defect the more difficult is that defect of cure. Certainly no subject in medical literature has been given more persistent attention than intestinal anastomosis. Even before Lembert introduced his special suture, in 1826, this subject had been considered from the surgical stand-point, Ramdhor, in 1730, and Louis, in 1757, having suggested different methods of repairing intestinal injuries. In reviewing the history of this subject it is evident that of the vast number of sutures and mechanical appliances which have been devised none has been more enduring than the Lembert suture. The very fact, however, that almost innumerable devices, based upon principles other than that of Lembert, have been tried, is evidence that this suture by no means fulfils all of the surgical conditions which may arise in connection with operations or injuries to the hollow peritoneal viscera. While there is a large number of essential requisites for the proper application of an intestinal suture or a mechanical contrivance, the cardinal one without doubt is rapidity of execution. Many methods are perfect as far as the actual mechanical closure of the bowel is concerned, and may easily be applied upon a cadaver or upon animals; but with their employment upon the human individual entirely different conditions are encountered, and as a result the suture may prove inadequate.

This deficiency in suture methods has been the justification for the employment of innumerable mechanical devices for the rapid joining of severed ends of the bowel. While some of these are most ingenious and are excellent in tiding one over an emergency, nevertheless, the majority complicate the operation and seriously jeopardize the subsequent convalescence of the patient. As it is the purpose of this paper to consider more especially the methods recently suggested by Wiggin and Connell, we shall only incidentally refer to the mechanical devices; for it is sufficiently self-evident that if a well-devised method of suture which can quickly be applied is at our command, it should take precedence over mechanical expedients.

In considering the various intestinal sutures, two general principles have been taken into account: (1) That of Lembert, that the suture should only penetrate the serous and muscular coat of the intestine without entering its lumen, and (2) the exact reverse of this principle, the introduction of the suture within the intestine itself. Within the last two decades many modifications of the Lembert suture have been made. The principles underlying this method have been vigorously assailed by many investigators, who have found, to say the least, strong theoretical objections to its employment, and yet no method has so long withstood the test of time. We have employed in many cases the Halsted method, which is an ingenious modification of the Lembert principle. It is a rectangular quilt suture penetrating to and picking up the submucous coat, thus bringing into close apposition the serous surfaces. Uniformly good results have followed its employment; nevertheless, its chief defect is the comparative slowness of its execution, and unless most carefully applied there are the dangers, (1) of penetrating all of the coats of the bowel, thus forming a capillary avenue for the passage of infectious matter from the intestine to the peritoneal cavity, and (2) the dangers of involuting too much of the edges of the intestine, and thus partially occluding the bowel by a circular diaphragm. While the last objections are strong ones, the chief one in our experience is the amount of time consumed in the completion of the operation. For simple lacerations of the bowel, or for closing exploratory incisions into a hollow viscus, we do not believe, however, that there is any suture so satisfactory as the Halsted; but it must be remembered that many of the lesions for which an intestinal

suture is required occur as emergencies and imperatively demand, on account of the dangers of shock, the least possible stay of the patient upon the operating table. This is essentially true of gunshot and stab wounds, and the injuries which may occur in a long, tedious pelvic operation, as is illustrated, for instance, by one of our own cases (Case V).

Within a comparatively short time we have had the opportunity of efficiently testing the principles involved in the method described by Connell and Wiggin. The application of the Connell¹ suture has proved so very satisfactory that without hesitation we believe it to be the best yet devised. Since the incorporation of bacteriologic principles in surgery, the fear of contamination from the bowel has possibly been exaggerated, and as a result it is considered by many surgeons an unpardonable surgical heresy to pass a suture in any way directly into the lumen of the bowel. Without doubt it is a serious fallacy to establish a suture track directly from the serous surface into the lumen of the bowel and back again with the knot upon the surface. But the Connell method avoids all the dangers of such a suture by tying all the knots within the bowel. As will be indicated later, we do not see the radical objections Connell offers to placing one or two Halsted sutures on the outside in the final completion of the operation, and we have, therefore, not followed his method in its entirety. The intestinal resections in which we have tested the Connell method have been done for the following conditions: Cases I, II, and III, for carcinoma of the colon; Case IV, for carcinomatous perforation of the stomach, and Case V, for a serious injury occurring to the sigmoid loop in the course of an operation for an extensive pelvic abscess. These cases have fully confirmed the claims of Connell, and we unhesitatingly commend the principles of this operation.

CASE I.—For four or five months the patient had complained of more or less constant pain above McBurney's point, which later became most intense and paroxysmal in character, and she had noted for several days before her admission to the hospital bloody mucus in the stools. A large palpable mass about the size of an orange was felt in the appendiceal region. This was resistant, hard, not especially painful, and could be shifted far over to the median line.

¹ Phila. Monthly Med. Journ., January, 1899.

Diagnosis: Carcinoma of the ascending colon. *Treatment:* Resection of the colon from just above the cecum to the hepatic flexure. An incision was made over McBurney's point, extending upward toward the gall-bladder, revealing a hard, cirrhotic tumor of the ascending colon, which was so dense as to make it appear incredible that any fecal matter or even flatus could pass through it. The pain, nausea, and vomiting had been quite intense for several days before the operation, showing that the obstruction had become complete. On account of the involvement of the retroperitoneal dorsal lymph glands the resection of the intestine was only done as a palliative measure, for there was no hope of permanent cure. An excision of the cecum and ascending colon was made, beginning at a point just above the entrance of the ileum into the cecum and extending up to the hepatic flexure. A temporary rubber ligature was thrown around each end of the divided intestine and was pushed out of the way with gauze sponges until the final end-to-end suturing was begun. The bowel was empty, and therefore no fecal matter escaped during the operation. The patient lost but little blood; nevertheless, on account of her weakened condition, the pulse became very bad, and it was necessary to expedite the operation as much as possible. The V-shaped gap left after the excision of the mesentery was rapidly whipped together with a running catgut suture. Next the bowel was brought together with a Connell suture at its mesenteric border, the greatest care being observed in properly enfolding the edges. Interrupted Connell sutures were then placed within the entire circumference of the bowel, except at the final point of closure, bringing the edges into neat approximation. To close this gap one Halsted quadrangular quilt suture was employed, departing in this step from Connell's advice. Catgut sutures were used throughout the operation. The patient made an ideal convalescence for five days; in the mean time the bowels moved satisfactorily, and she had been unusually comfortable. On the afternoon of the fifth day, however, the intestines became slightly distended, and suddenly she cried out with pain in the region of the operation, saying she felt as though something had broken. From this time on her symptoms rapidly grew worse, and within twelve hours she died of a fulminating peritonitis. Reopening the abdomen was advised to close the point of rupture, but was refused by the husband on the ground of the certain recurrence of the cancer.

In reviewing this case we attribute the sudden rupture of the bowel to the rapid absorption of the catgut sutures, and in subsequent cases we have avoided this danger by using fine silk. In view of the fact that the sutures will pass by the bowel, it is a better surgical policy to use a non-absorbable rather than an absorbable ligature.

CASE II.—Single, aged 29 years (Fig. 1). Carcinoma in the middle of the sigmoid loop of the colon, which produced symptoms for about three months previous to the operation. The growth was well circumscribed and closely confined to an area about an inch and a half in diameter. The entire chain of mesenteric glands was involved, although no distinct area of metastasis to other organs could be detected.

Six inches of the sigmoid was resected, followed by end-to-end anastomosis by the Wiggan-Connell method. The patient bore the operation very well; at its completion her pulse was 140, respiration 30, temperature normal. In five hours the pulse fell to 112 under stimulation, and so remained until early next morning, when it became more rapid and rose gradually to its maximum, 170 on the fourth day, temperature 104° F., respiration 30. During this time she was nauseated and vomited frequently, the vomiting consisting largely of bile and mucus. The abdomen was greatly distended, hard, and extremely tender; pain was severe, and peristalsis almost absent, the only audible sound being an occasional click. On the third and fourth days she was delirious. Cardiac stimulants and hypodermoclyses were given frequently. On the fourth day, calomel and salts being administered, a large liquid evacuation resulted. From this time the patient began to improve. Her pulse and temperature fell slowly, reaching normal on the tenth day. Distention subsided, pain and tenderness disappeared, and she had frequent liquid bowel movements containing some mucus. She gained steadily and, beyond some slight superficial suppuration of the wound, her further convalescence was uneventful. Upon discharge, August 20, she was still rather weak, but generally in good condition. The abdominal wound was entirely healed and strong. Rectal examination revealed nothing beyond slight tenderness.

Shortly after leaving the hospital she obtained employment as a chambermaid. Her health was fair and her appetite good, but she was still somewhat weak and troubled with a persistent diarrhea. Proctoscopic examination was advised, but was refused by the

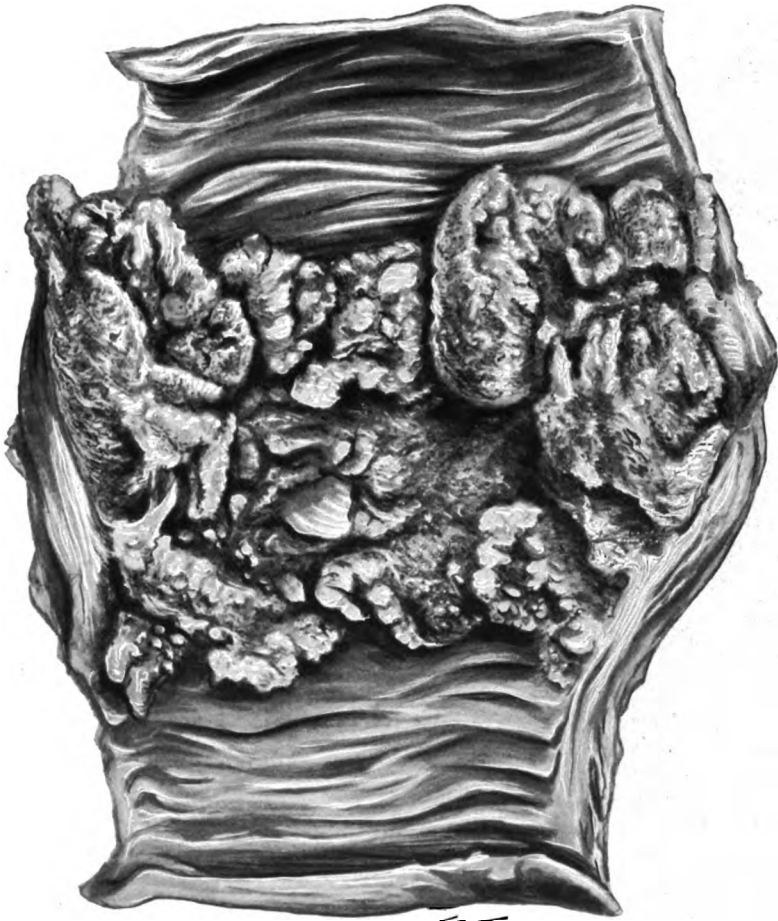


FIG. 1.—Carcinoma of the sigmoid flexure. In this case a portion of the bowel, sufficiently large to include the carcinoma and a considerable area of healthy tissue, was excised. The danger in these cases, as was demonstrated in this especial instance, is not in a return of the growth at the site of operation, but in a metastatic growth in the mesenteric retroperitoneal glands and liver.

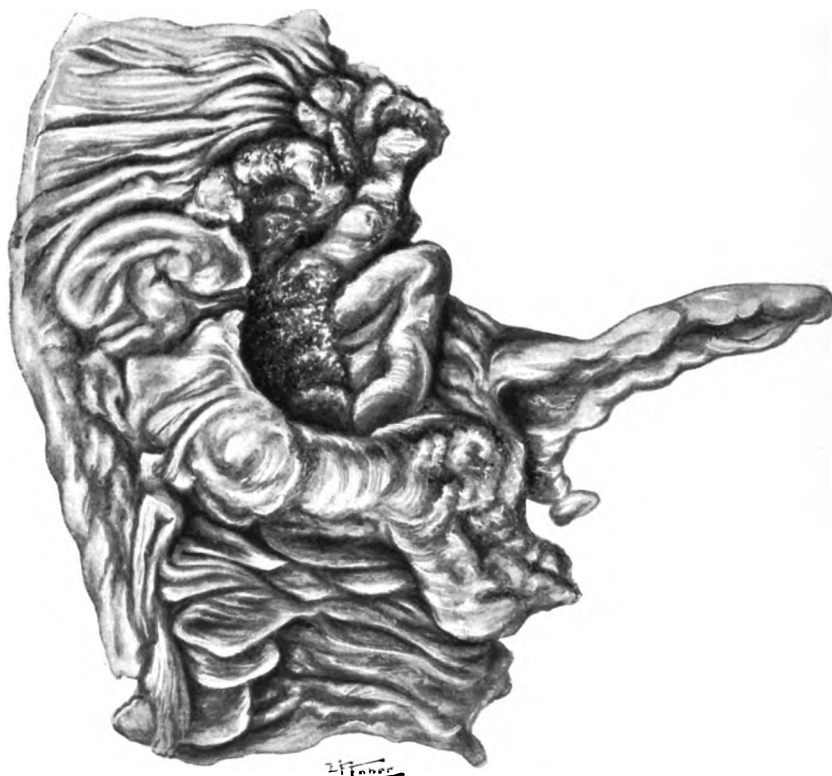


FIG. 2.—Carcinoma involving the cecum in immediate proximity to the vermiform appendix and the ileocecal valve. In this case a considerable portion of the ascending colon, with the cecum, was excised, and the ileum was implanted into the ascending colon by end-to-end anastomosis.

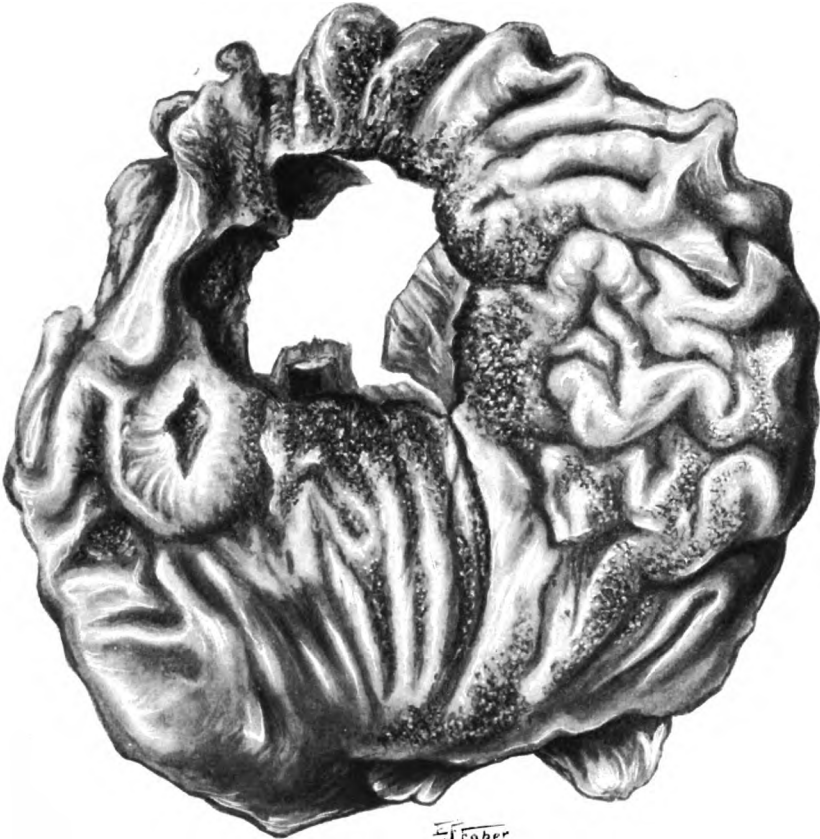


FIG. 3.—Carcinoma of the anterior wall of the stomach with perforation. In this case the pyloric third of the stomach was excised and the duodenum was implanted by end-to-end anastomosis into the remaining portion of the stomach. Although the carcinoma was very advanced, the patient is still alive (10 months after operation), and is in comparatively good health. Thus far there has been no evidence of a recurrence or metastasis.

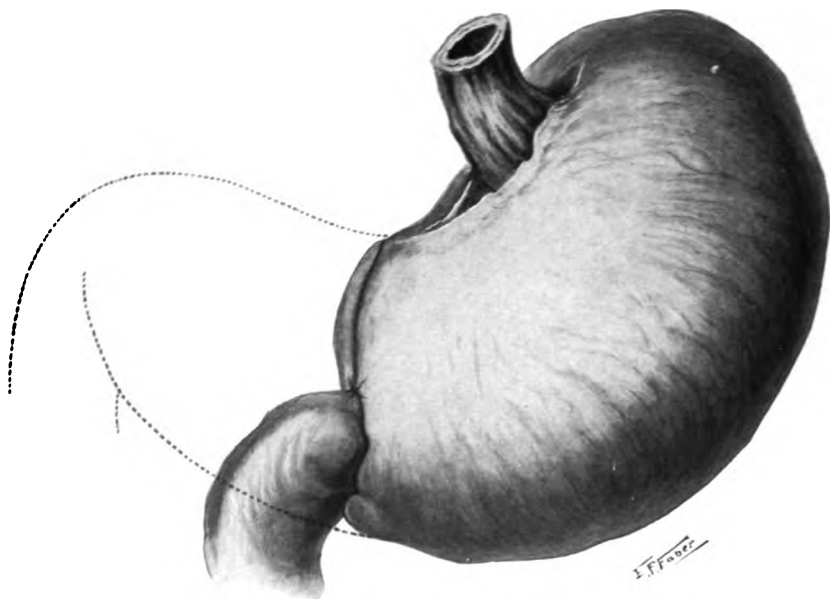


FIG. 4.—After the excision of the pyloric third of the stomach the upper part of the opening left in the cardiac end was closed with Connell sutures, narrowing it down to an aperture of sufficient size into which the duodenum could be implanted. The Connell suture was used here with the exception of the final closure, which was effected by a triangular suture, based upon the Halsted principle, bringing into close apposition the sutured line in the stomach and the implanted end of the duodenum.

patient. The following January she returned for treatment, complaining of abdominal pain, distention, anorexia, and progressive weakness. She had not gained in weight. The liver was found enlarged and very hard, but not tender. On January 25 she stopped work and went to bed. All of the above symptoms were exaggerated, and the liver became larger, and was hard, nodular, and tender. Diarrhea ceased and she became constipated. The general abdominal pain became localized to the liver and was excruciating; distention subsided and she wasted rapidly. Rectal examination revealed nothing. She died on April 6, and at this time the liver reached the umbilicus, was hard, painful, and tender; there was nausea and vomiting; constipation, no jaundice or ascites; her abdomen was flat, the temperature subnormal, and her pulse 140, weak, and irregular. An autopsy was refused.

CASE III.—Carcinoma of caput coli (Fig. 2). The growth was papillary and very friable, surrounding the ileocecal valve on the cecal side. The ileum and appendix were not involved, though the growth extended well down in the cecum. In the fatty tissue of the mesentery a small carcinomatous nodule was found after removal. The cecum with appendix and terminal inch of the ileum were resected, and an end-to-end implantation of the ileum into the colon was performed by the Wiggin-Connell method. The patient passed through a normal post-operative course. The bowels moved well on the fourth day, after which she was remarkably comfortable. She was discharged in good condition four weeks after the operation.

The patient remained in fairly good condition for several months after her discharge, though she never gained her full strength, and later became progressively weaker and complained of pain in the region of the operation. One month before her death a good-sized mass was again to be palpated in the right iliac fossa; pain grew steadily worse and weakness more marked, until she finally passed away, seven months after the operation.

CASE IV.—Carcinoma of the pyloric end of the stomach (Figs. 3 and 4). The growth was situated near the pyloric orifice along the greater curvature, and had ulcerated through the entire thickness of the stomach wall, communication with the peritoneal cavity being prevented by an adherent mass of omentum. This perforation was 4 cm. in diameter, the edge was hard, and showed a tendency to be undermined. It appeared slightly varicosed and of a deep red color.

The entire stomach wall in this area was indurated. The whole indurated area was removed, and included about one-half of the stomach and an inch of the duodenum. The opening in the stomach was partly closed with the Connell suture and the duodenum implanted as in the previous case. Following the operation the patient's temperature was 99.4° F., pulse 108, respiration 20. The pulse, which was of good quality, rose gradually to 115, the temperature to 101.6° F. on the second day, and then both synchronously fell slowly to normal on the eighth day. Her only stimulant consisted of strychnin sulphate, $\frac{1}{80}$ grain (0.002 gram) every 4 hours. Nausea and vomiting persisted until the third day. Only on the evening of the day of operation was the vomitus blood-tinged; after this it was biliary in character and small in amount. On the second day following a high compound enema, which was effectual, nutritive enemas were begun, consisting of an egg, 1 ounce (30 c.c.) of liquid peptonoids, and 4 ounces (120 c.c.) of peptonized milk. This was retained, as were most of her enemas, given every 6 hours. Upon this she subsisted, taking nothing by the mouth except a little cracked ice or an occasional swallow of water, until the seventh day, when she was given albumen water, $\frac{1}{2}$ ounce (15 c.c.) every hour in addition to the enemas. This she enjoyed and retained. On the ninth day her diet was increased, and she took beef-juice and peptonized milk, $\frac{1}{2}$ ounce (15 c.c.) at a time, alternately every hour. Her bowels moved well daily, following an irrigation of salt solution. On the eleventh day the amount of her nourishment was increased to 1 ounce (30 c.c.) at a time; this was all retained and caused no nausea. On the thirteenth day she took some milk-toast, the following day a poached egg, and on the fifteenth day some white meat of chicken.

On the twenty-second day she vomited 32 ounces (650 c.c.) of fluid, preceded by considerable distress and nausea. From this time until her discharge, on the thirty-second day, she vomited about every four days. Upon discharge her general condition was excellent; she was taking regular diet, although her capacity for food was distinctly decreased, requiring smaller quantities, repeated at more frequent intervals. The wound healed primarily.

CASE V.—Right pyosalpinx; left tubo-ovarian abscess, which was adherent to the sigmoid and its mesentery. Upon separating the abscess the mesosigmoid, with its vascular trunks, was lacerated,

leaving about 2 inches of inflamed sigmoid poorly vascularized. It was quickly resected, followed by an end-to-end anastomosis by the Wigin-Connell method. A gauze drain was inserted down to the anastomosis.

The patient reacted promptly from slight shock, and her convalescence was perfectly normal with absolutely no post-operative distention. On the fourth day, after a course of calomel and salts, the bowels moved well; following this, they responded satisfactorily to cascara sagrada or a small injection of glycerin. On the fifth day about two-thirds of the gauze drain was withdrawn, and on the eighth day the remaining portion was removed. By the twenty-first day she was out of bed and feeling quite well. Her appetite was poor, though she was on a general diet. She was discharged in good condition at the end of four weeks. The wound had entirely healed and was fairly strong.

In a review of the preceding cases it will be seen that of the carcinoma cases only one, the resection of the stomach, survived any length of time after the operation. The question, therefore, naturally arises, Is it advisable to resect an intestine for cancer? for the history of these cases shows that there is almost inevitably a fatal recurrence. In our own experience the operation is justified by the relief of the patient from the agonizing intestinal cramp and pain incident to the obstruction. Certainly it is better to resect an intestine and thus give complete relief from the intense pain which these patients suffer, even if there is a subsequent recurrence in the liver, than to wait until the inevitable obstruction is complete, and then be forced to establish an intestino-abdominal fistula with its disagreeable train of post-operative sequels incident to the involuntary discharge of fecal matter upon the abdominal wall.

Our own rule, therefore, is to perform a resection in these cases whenever possible rather than to resort to a colostomy. Thus far the patient with carcinoma of the stomach, which required such extensive resection, has done remarkably well. She has regained her health sufficiently to be able to take up all of her social duties; and while she still suffers from occasional gastric disturbances, there has as yet been no evidence of a recurrence of the carcinoma. She has gained in general health remarkably, and is delighted with the result of her operation. From the history of these cases it seems

hardly possible that this case will be permanently cured. Time alone, however, will show whether this may be an exception.

The Lembert Suture and its Modifications.—In the absence of a suture filling more of the requirements of an ideal, the Lembert has stood since 1826 better than any other. It has frequently been modified, and there are in this class at least 13 varieties. As originally devised, it should pass through the peritoneal and muscular coats only, and, therefore, does not enter or communicate with the lumen of the bowel. Dupuytren modified this suture by making it continuous rather than interrupted. Breidenbach inverted the original, placing the knots between the apposed serous surfaces. Gely, in 1844,¹ made a double stitch by using one thread and two needles, and this was further modified. Gussenbauer devised a stitch to act as both the Czerny and the Lembert, and which did not perforate the mucous membrane. Halsted, in 1891, devised a most efficient suture based upon the Lembert principle, and of this class it still stands as one of the best. The Halsted suture is a rectangular quilt suture, which reduces the knots to half the number of the Lembert interrupted stitch. He called especial attention to the submucosa as the only coat with sufficient strength to hold a suture, and recommended the penetration, but urgently warned against the perforation of this layer (Figs. 5 and 6). Cushing, in endeavoring to make a further improvement, devised a continuous right-angle suture,—really little more than a continuous quilt suture. In 1892, Abbe introduced his method for lateral anastomosis, using a continuous Lembert for the purpose. Finally, in this same year, M. E. Connell² presented a continuous right-angle stitch perforating all coats, with the knots buried between the apposed serous surfaces. These and several more, with the exception of the latter, are all on the Lembert principle and, therefore, open to the following objections:

(1) All knots and a greater part of the thread are exposed on the peritoneal surface, M. E. Connell's alone excepted.

(2) Too large a diaphragm is formed within the lumen, particularly when two rows of sutures are inserted, as in the Czerny-Lembert.

¹ Intern. Encyclopedia of Surgery, Ashhurst, 1884.

² Medical Record, September 17, 1892.

(3) It requires considerable time, experience, and dexterity to introduce this suture properly.

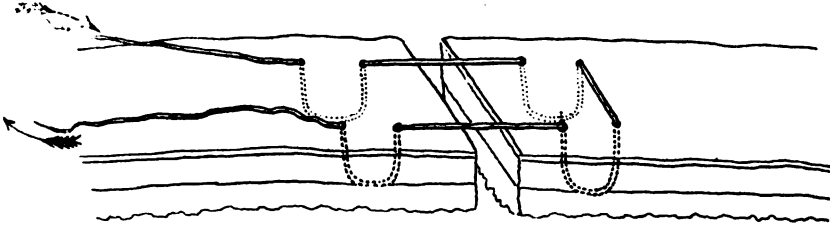


FIG. 5.—Schematic drawing representing the principles involved in the Halsted quadrangular suture. As will be seen, this suture is so inserted that it penetrates the peritoneal and muscular coats of the bowel, and picks up the submucous or fibrous coat. The needle should not penetrate the bowel, and when the suture is tied it should hold firmly if it has picked up the submucous coat.

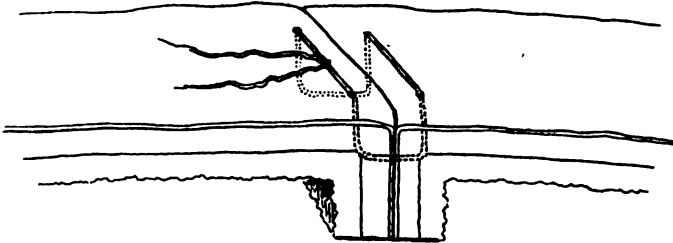


FIG. 6.—Halsted suture completed. The bowel is inverted, the peritoneum is brought into close contact, and the suture does not penetrate the lumen of the bowel.

(4) When applied as originally intended, it passes through only serous and muscular coats, which may yield very readily, neither coat being sufficiently strong to hold, particularly under the high tension which so frequently occurs in the distention after these operations. To hold and maintain apposition the suture must, therefore, pass through the only firm coat of the bowel, the submucosa, a non-elastic, fibrous tunic. This point is generally conceded by most authorities at present. By perforating this layer the suture is carried into the mucous layer containing the glands, which communicate directly with the lumen of the bowel. Therefore, liquid infectious material may pass by capillarity along the stitch as far as the knot, which is on the peritoneal surface, and may set up a peritonitis. To avoid this danger the suture must not perforate the submucous layer; but, upon the other hand, to prevent yielding it certainly must penetrate it. Connell¹ raises the question as to the

¹ Jour. Amer. Med. Assoc., October 12, 1901.

possibility of penetrating without perforating this layer into the mucous coat or actually into the lumen of the gut. According to Edmunds and Ballance, the submucosa is $1/250$ of an inch thick. Connell very pertinently seizes upon this fact and criticises the Halsted principle by calling attention to the fact that the diameter of the intestinal needle usually employed is $1/40$ of an inch. If these statements are correct, the difficulty or anatomic impossibility of picking up a part of the submucosa without perforating it can be imagined. It is probably true, therefore, that with the greatest care some of the Lambert sutures enter the mucous layer and even the lumen of the bowel. In the duodenum, as pointed out by Connell, the glands of Brunner are located in the submucous layer and empty by almost straight ducts into the bowel; consequently, sutures penetrating the submucosa in this part of the bowel are almost certain to pass through one of the glands and so communicate with the lumen. Therefore, in the duodenum the Lambert suture is at least theoretically faulty, even if it does not directly penetrate the lumen itself. Be these objections as they may, penetrating or not penetrating, communicating or not communicating with the lumen, the fact remains that the Lambert and the Halsted modifications of the Lambert suture have universally been used with good results. Therefore, we by no means concur with Connell and others who discard the Halsted suture, but employ it in some cases to the preference of the other sutures. On the other hand, we would likewise earnestly recommend in many cases—in fact, in practically all intestinal resections—the Connell method. We desire to harmonize the use of both sutures in surgery, for each is pre-eminently useful in its own practical field.

Another objection offered to the Lambert suture is that it is apt to produce adhesions; any suture which is exposed on the peritoneal surface and has bare knots, by irritating adjacent peritoneal surfaces, will do this. Again, it is apt to produce gangrene of the inverted margins, particularly with the Czerny-Lambert suture, for two rows of suture are more likely to obstruct circulation than one row.

Intestinal sutures, after accomplishing their purpose, either become encysted or pass into the lumen and are discharged with the feces. If they become encysted, they may give rise to "objectionable or dangerous symptoms." If the Lambert suture were dis-

charged, it would be necessary for it to pass through the entire intestinal wall, a rather slow and dangerous process. Gross¹ claims that this phenomenon unquestionably occurs, and demonstrates it with a cut which shows a stitch about to separate. This has also been seen by Edmunds and Ballance in dogs from 2 to 3 weeks after operation.

In referring to the Lembert suture, Gely says, "It does not securely close the wound unless the points of suture are tolerably near together, and the danger of inflammation is necessarily increased with the number of sutures."

Most of the above points are used by Connell in arguing against the Lembert suture; and though theoretically they may all be correct, as has been said before, practically the Lembert suture and its modifications have done good service.

Suture with Knots inside the Bowel.—Connell bases most of his arguments in favor of his method upon the tying of the knot within the bowel. In this way the suture is without doubt stronger than any other, except those, of course, which pass through the entire wall and tie outside. It is quite obvious, however, that with the knot on the peritoneal surface there is greater danger of peritonitis, generated by infectious materials passing along the sutures by capillarity as far as the knot, and there forming a local point of infection, which may lead to a general peritoneal infection. With the knot placed within the lumen, though the same process may occur, theoretically the material will pass around the suture to its starting-point—the knot—by capillary attraction and produce no harm. Chlumski, in his investigations, concluded that in all cases of union by suture alone in which leakage occurred the seat of leakage was at the site of the knot. Therefore, by placing the knot within the lumen there is less danger of infecting the peritoneum with a suture which passes through all coats, and it is also stronger and is less likely to yield and allow leakage. Adhesions are much less likely to form, the irritating knot being removed from contact with the peritoneum. Halsted states² that "the success of any form of intestinal suture is inversely proportionate to the extent of the adhesions which result from the employment of the particular method." The Connell

¹ System of Surgery, 1864.

² Johns Hopkins Hosp. Bull., January, 1892.

suture can be more carefully and accurately placed, making the diaphragm within the lumen as small as possible. Any suture depending upon serous apposition must produce a diaphragm by inverting the cut ends. By applying the suture externally this factor cannot accurately be regulated. It has been shown that post-operative stricture is more frequently due to this diaphragm than to cicatricial contraction. Connell claims that a small diaphragm is desirable, as it acts like a valve—the greater the pressure on the inside, the more tightly will the two inverted edges be forced together.

By perforating all coats and tying within the lumen the danger of obstructing the circulation and producing gangrene is slight, for only a small portion of the edges are invaginated and then only with one row of sutures.

Referring to the through-and-through suture, Wiggin says, "Firmly suturing all the coats gives great healing capacity to the ends of the bowel and the stitches are not likely to tear out." As has been said, a suture either becomes encysted or passes through the wall and is discharged. By passing through all coats and tying within the lumen the suture will always be discharged into the bowel, never remaining as an irritating foreign body. Another surgical advantage is that it passes in a much shorter time. In one of Connell's experiments a continuous suture was discharged in 21 days.

With perhaps all these facts in mind, many methods have been devised to place a firm suture with the knot within the lumen, but all methods except that of F. G. Connell have failed in this object.

Vesein, in 1871, passed his suture through all coats, but simply twisted the thread inside and pushed the last suture into the lumen. Czerny added an internal suture to the Lembert. This made a very firm and secure union, but required time and had the disadvantage of requiring two rows of sutures, with danger of necrosis through strangulation of the inverted portion. Bishop, in 1885, devised a shoemaker's or so-called "continuous-interrupted" stitch. To cover up his final knots he recommends a Lembert suture for reinforcement. Woelfler's suture is practically the same as the Czerny-Lembert. Kummer, in 1891, placed a row of sutures on the mucous membrane and inverted the serous surfaces, stitching them externally, only differing slightly from the Czerny-Lembert. Maunsell,

in 1882 (described in 1892),¹ placed all the knots of the circular enterorrhaphy within the lumen, the sutures perforating all coats. This he accomplished by making a counter-opening into which the cut ends were invaginated. At the completion of the enterorrhaphy the counter-opening was closed by means of a running Lembert suture. This method realizes more of the points of the ideal than any yet mentioned. The serious objection to this method is the counter-opening, which is closed with an external suture. Ullman modified the Maunsell method by inserting a hollow cylinder of carrot, around which the invaginated portions were tied. Oheatle and Hartigan, both in 1897, independently modified Maunsell's method by making a longitudinal incision on both proximal and distal ends from the circular cut. This was closed with a Lembert suture after all knots in the circular enterorrhaphy were tied inside the lumen. Wiggin,² in 1898, modified the Maunsell method by doing away with the counter-opening and invagination. He used the ordinary suture, passing through all coats and tying within the lumen, except the last suture, which was a Lembert. Allis, in 1902, performed a method similar to Wiggin's, except that his last stitch perforated all coats and was tied between the apposed serous surfaces, the same as M. E. Connell used throughout his method. Dowd,³ in 1902, used a row of sutures perforating all coats, with knots within the lumen; the last knot he tied and pushed into the lumen. He finished by covering the line of union with a Cushing suture. This is similar to the methods of von Frey and Lilienthal. Campbell,⁴ in 1903, presents a very unique method, but one which Bartlett claims was brought forward in 1895 by von Frey, who performed it on dogs only, whereas Campbell has done more extensive work and has tried it in two cases; one patient died 36 hours after operation, but probably not as the result of faulty union. The method consists of dissecting back a flap of serosa and muscularis, removing the diseased portion as far as the root of the cuff on the distal end, and cutting through all coats evenly on the proximal end. Proximal end and denuded distal end are approximated with through-and-through sutures tied within the lumen, bringing end to

¹ Amer. Jour. Med. Sci., March, 1892.

² Medical Record, November 19, 1898.

³ Annals of Surgery, 1902, xxxvi.

⁴ Jour. Amer. Med. Assoc., May 30, 1903.

end without inverting. The seromuscular cuff is then reflected over the line of union and secured by several sutures passing through serosa and muscularis. The method of F. G. Connell, of Chicago, has only recently been devised, and while it is based upon the principles employed by other surgeons before him, it is essentially unique, and is the best method of intestinal anastomosis yet advanced. With but few exceptions it has received only words of commendation. Although it was only devised in 1899, Connell was able in January, 1903,¹ to collect from the literature, with his own, 64 cases, with 21 deaths, and but one of these, in his opinion, could be traced directly to the suture; this was a case of tubercular peritonitis with attenuated intestinal walls. The other deaths were largely due to shock, the patients being in many instances *in extremis* when operated upon. The method is, no doubt, already so well known as not to require a detailed description here. Connell's paper is so elaborate in detail that it should be consulted for the full description of his method; suffice it to say, he uses a through-and-through suture with all knots tied within the lumen. He follows his principle to its ultimate detail by placing the last knot within the lumen, and here he goes, we think, to considerable trouble and expends much unnecessary time, for the final small aperture can certainly be very securely closed with a simple Lembert or a Halsted suture. Or, as we believe, better still, by a quilt suture modified in this manner: passing through the coats, parallel to the edge of the wound, the same distance from this edge as the previous Connell sutures have passed and for the same distance necessary to close the remaining gap, then coming out onto the surface of the gut; crossing the wound, it passes in a similar manner to the other side, but in the opposite direction. This brings the ends of the suture together on a plane with the wound, and when tied no part of the suture will be visible on the peritoneal surface, the knot being buried between the apposed serous surfaces.

The method used in the five cases herewith reported was that of Wiggin, with the Connell suture, in that all knots except the last were tied within the lumen, with a final Halsted to close the last gap in the bowel.

The Connell suture consists of a square stitch, either continuous

¹ American Medicine, January 24, 1903.

or interrupted. It passes from the mucous surface on one side through all coats; crossing the wound, it passes through all coats from the serous surface on the other side, placed $\frac{1}{8}$ of an inch from the free edge; it is then carried along the lumen parallel to the free edge for $\frac{1}{8}$ of an inch, passing back to the other side parallel to the first half, reversing the above order. If the stitch is to be interrupted, this will bring the ends of the suture on the same side of the wound, and will place the knot to one side instead of directly on top of the approximated surfaces, as with the Maunsell suture, which is the ordinary circular one, out on one side and in on the other. The advantages of the square suture over the circular one are, as

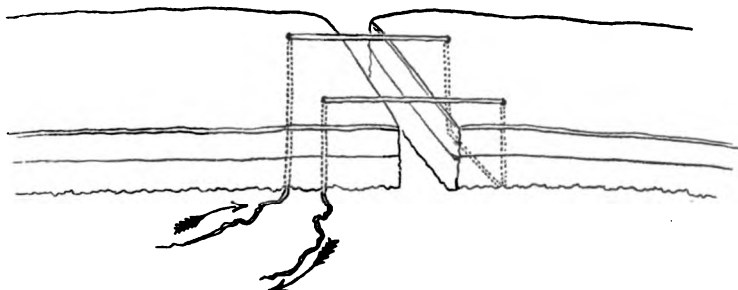


FIG. 7.—Schematic representation of the Connell suture. The needle is thrust through the bowel from within upward, crosses the peritoneal gap, then penetrates again all the coats of the bowel, is carried over a short distance, and is thrust outward, reversing the previously described maneuvers. When this suture is tied within the bowel all of the coats of the bowel are inverted as shown in Fig. 8. If the suture is properly applied, little, if any, of it should be exposed upon the surface.

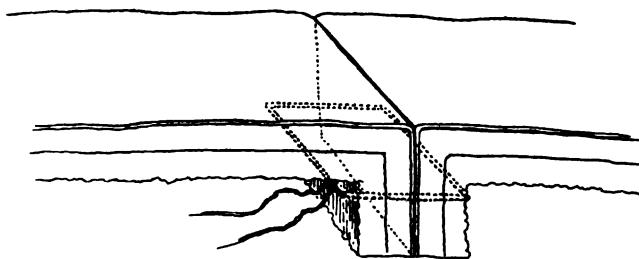


FIG. 8.—Connell suture tied. The knot and the greater part of the suture are within the bowel. From this point it is ultimately discharged into the bowel.

has been said, that the knot is placed to one side, where it is out of the way; it draws the apposed serous surfaces firmly in contact, exposing little or nothing of the stitch on the outside; it requires only half the number of knots, and in this way consumes less time;

and finally, and above all, it precludes the possibility of slipping. With the circular suture much pressure from within may displace one end of the bowel, even to such a degree as to allow a communication between the bowel and the peritoneal cavity. With the Connell square stitch this is impossible (Figs. 7 and 8).

Mechanical Devices for Repairing the Bowel.—A word in conclusion as to the various mechanical devices for facilitating intestinal anastomosis. The best known and most largely used of these devices is the Murphy button. Though a quick and safe method, it has the great disadvantage of leaving a large foreign body in the bowel. The McGraw elastic ligature, advanced in 1891, has recently been written upon by Walker, of Detroit,¹ in connection with gastrojejunostomy for gastroptosis, and also by McGraw himself,² but with the recent suture methods before us we do not believe this ingenious device is advisable. The forceps or clamps of Mudd, Grant, Morrison, Laplace, Vidal,³ O'Hara, and Cowardine⁴ are a great convenience, enabling one to place a more regular Lembert suture with greater speed and limiting the diaphragm; but if one accustoms himself to suturing with them, then suturing without their aid, as may be necessary, becomes a slow, tedious, and possibly a very awkward operation. Without doubt, therefore, it is better to do away with these mechanical aids and depend upon the hands alone in placing the best intestinal suture. Turck,⁵ of Chicago, writes upon the Connell method, and simplifies the technic by the use of four small tenaculums to serve in place of traction sutures, and a guarded hook-line instrument to be placed between the layers in contact to draw through the bowel lumen, the last suture to be tied. With this method they are undoubted aids, but here again simplicity is preferable. To do an anastomosis armed alone with a needle and thread, and to do it quickly and safely, is to be preferred to the method which requires mechanical devices.

CONCLUSIONS.—(1) The Connell intestinal suture is, without doubt, the most rapid and most perfect method of suture yet devised for end-to-end or lateral anastomoses.

¹ Jour. Amer. Med. Assoc., January 17, 1903.

² American Medicine, October 3, 1903.

³ Revue de Gynecologie, May, 1903.

⁴ Brit. Med. Jour., February 28, 1903.

⁵ Jour. Amer. Med. Assoc., xl, p. 637.

(2) For the closure of simple perforations or lacerations, or for exploratory incisions into the hollow viscera, Halsted's rectangular quilt suture is easy of execution and quite safe, and is of decided preference.

(3) All mechanical devices for intestinal anastomosis should be discarded in favor of the Connell suture.

(4) Neither the suture within the bowel, as represented by the Wiggan-Connell method, nor the Lembert suture and its modifications should have the exclusive preference in intestinal surgery, for both are of the greatest value in special fields, and each should be at the command of the surgeon, to be used as his judgment dictates.

COMPLICATIONS MET IN THE SURGICAL TREATMENT OF DISEASES OF THE TESTICLE

A PAPER READ BEFORE THE SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION,
DECEMBER, 1903

BY J. McFADDEN GASTON, JR., A.M., M.D.

Genito-Urinary Surgeon to the Presbyterian Hospital, Atlanta, Georgia

IN the surgical treatment of diseases of the testicle we may meet as complications hernia, varicocele, hydrocele, and other affections.

Having met with several such cases, my attention was directed to it as a subject worthy of consideration.

CASE I.—W. H. E., aged 58 years, had suffered from a double hydrocele which was tapped at one time and the contents removed, only to reappear. When I first saw him, in 1892, he was suffering from the effects of a very large accumulation on both sides of the scrotum, but larger on the right side, which was as large as the head of a new-born child. This mass was tapped with a trocar and canula and injected with Lugol's solution. Great swelling ending in supuration following, an incision was made to evacuate the pus. The contents were foul and grumous, with pieces of disintegrated tissue and a piece of osseous material.

Dr. J. F. Binnie, of Kansas City, Mo., has studied the subject of myositis ossificans traumatica, and traces the formation of bony material to an inflammation of the muscles. In this case there was an inflammation of the cremaster muscles leading to the formation of this material. A full account of this subject, also containing this case among those referred to by Dr. Binnie, may be found in the Transactions of the American Surgical Association for 1903.

The accumulation never reappeared on this side, but did not increase on the left side, so that it was not deemed necessary to carry on the treatment any farther at that time.

A considerable amount of trouble was experienced, however, in 1897, when a hernia appeared in the right inguinal canal. As there was some inflammation and considerable doubt as to the increased size of the canal, it was thought best to use an ointment of equal parts of mercurial, belladonna, iodin, and camphor ointments, after which a truss was adapted. On June 3, 1903, the patient presented

himself with a mass which was red and very tense, evidently due to a descent of inguinal hernia, which had become irreducible. Having used taxis for a sufficient time to convince me of the futility of further attempts, I advised him to go to the Presbyterian Hospital, where I could operate. He consented, and was given a hypodermic injection of morphin sulphate, $\frac{1}{4}$ grain (0.015 gram), and atropin sulphate, $\frac{1}{16}$ grain (0.0004 gram).

The next day, after having been shaved and the scrotum and abdomen prepared for an aseptic operation, he was anesthetized. Beginning at the anterior superior spinous process, an incision was carried to the region immediately over the internal ring. The Bassini operation was done with no important modification. In addition to the intestine, a very large amount of omentum was found in the sac, and this was excised. There was also a considerable amount of serum and adhesion in the sac.

The intestine was edematous and quite dark in color, but after warm cloths had been applied it became more natural. The knuckles of intestine were returned to the abdominal cavity.

Having accomplished this, the next step of the operation was to examine the testicle, which was found diseased and was removed, after ligating the veins and arteries leading from and to it respectively. Kangaroo tendon was used to bring together the muscles and fascia on the inner side and the shelving portions of Poupart's ligament, while the conjoined tendon was also included in the lower portion of this line of sutures. The cord was held out of place, but a suture of Kangaroo tendon was inserted above it before it was pulled out of its bed and connection with the fascia. Bull and Coley have found kangaroo tendon superior to silver wire or silkworm gut, and I can testify to the satisfaction it gave in this case. The author of the operation, Bassini, has not performed as many operations, so far as we can learn, as Bull and Coley have, but has had only one death in 262 cases, while all but four were traced, and in all only seven relapses.

Bull and Coley do not recommend operations upon patients over 60, and in none who are of extra heavy weight and obese. This was a case of emergency, and, although the man weighed 240 pounds and had a considerable amount of fat, he bore the operation well. He was in good health, however, and a man of regular habits.

He will be presented to you in order that you may see the extent

of the incision and the result of the castration. The incision measured about twelve inches after the whole line had healed (Fig. 1).

The mass of omentum, and tumor with testicle, have been preserved and may be seen to be larger than that usually removed, probably as large as a cocoanut (Fig. 2).

CASE II.—A typical case of complication of hydrocele and cystic degeneration of testicle occurred lately in a patient in my service at the Presbyterian Hospital. W. M., aged 30 years, was tapped by Dr. J. Grant Wilkins several times, and the fluid recurred each time until he used an injection of carbolic acid. A painful testicle remained, and as there was some doubt, he consulted Dr. Floyd W. McRae, who believed an operation was indicated to determine and remedy the extent of disease. I examined him at the Presbyterian Hospital, August 4, 1903, and with the history of fluid of a straw color which had been removed, but returned probably six times, I determined upon a more radical operation, even stating to the patient that the removal of the testicle might be necessary. He agreed to the castration on one side, if thought necessary, after the condition of the testicle could be examined during the operation.

Knowing the tunica vaginalis testis was involved, and reasoning that at least a complete excision of it would be required to prevent a return of the fluid, this operation was at first contemplated.

On August 5, 1903, after the scrotum had been thoroughly shaved, scrubbed, and sterilized by antiseptic solutions and gauze, to prepare the field of operation, the patient having been given a hypodermic injection of $\frac{1}{4}$ grain of morphin sulphate and $\frac{1}{160}$ grain of atropin sulphate and etherized, the incision was made on the outer side of the scrotum on the left side. The tunica vaginalis testis was dissected away from the outer tissues, including the fascia, dartos, and skin, and the whole testicle was pulled down through the opening, leaving the smooth and tense surface of the tunica vaginalis testis. The tumor presented itself as a large, globular, fluctuating mass at the outlet of the wound. The trocar and canula were now used to evacuate this collection of fluid, and then an incision beginning at the opening made by the trocar was made with a tenotome and enlarged by scissors.

A complication of a hydrocele and a cystic degeneration of the testicle was discovered. The testicle was disengaged from the sur-



FIG. 1.—Showing the result of the operation in Case 1.



FIG. 2.—Photograph of the testicle and portion of omentum removed in Case I. *a.* testicle.

rounding structures, while the cord and veins were ligated and cut off with scissors.

The tunica vaginalis, which was very thick and considerably stretched, was trimmed off close to the internal ring, and then the edges brought over the ligated cord and vessels.

The wound was then closed, with the exception of a small place for drainage. The patient made a good recovery, and has been examined several times since so as to ascertain the reduction of the cord to normal size.

CASE III.—Another instance of complication with varicocele occurred soon afterward in my service at the Presbyterian Hospital. E. I. B., aged 25 years, was suffering from an enlargement of veins of the scrotum, and the baggy condition of the latter required the scrotum to be supported by a suspensory bandage. He had been examined by quite a number of physicians and surgeons, and finally came under the care of Dr. E. C. Cartledge, who had referred him to me. He had been a morphin habitué, and had been treated by Dr. Cartledge with hyoscin hydrobromate, abandoning the use of the opiate and whiskey. It was thought best not to give the usual dose of morphin and atropin under these circumstances and because he had already been given a small dose during the night. He was shaved and prepared as usual for the open operation by deligation and excision of veins and put under the influence of ether. On August 18, 1903, the operation was performed. He was very sick just before with a headache, a little rise of temperature showing itself, but the removal of the very much dilated veins also removed this nervous headache.

It was supposed that the scrotum would be supported sufficiently by the dartos when the ends of the cut veins were attached, as the excision was done close to the globus minor. This proved to be the case, and he is doing well, having gone to work. His nervous system was deranged and he demanded opiates, but was never allowed them but at rare intervals.

The orchitis and epididymitis subsided, and he regained his spirits very rapidly.

In all of these patients we should investigate the causes of trouble, and I would urge an incision as indicated for a proper surgical treatment of complications in many obscure affections of the testicles.

Halsted's methods of the radical cure of inguinal hernia are very much simplified by the use of the implantation of the cremaster muscle and the closure of the internal inguinal ring by it and the rectus fibers. While the usual advice is given by Bull and Coley that one method only should be practised by one surgeon because of the dexterity in operation to be obtained by practice, it seems that Bassini has proposed a method which is very easily applied to any case.

In the vast number of cases which have been treated respectively at the Hospital for the Crippled and Ruptured and Johns Hopkins Hospital excellent results have been obtained by both methods.

A most important adjunct to the proper after-treatment and dressing of an operation for inguinal hernia is the spica bandage and the plaster-of-Paris spica bandage. The muscles are thus kept in a state of rest and quiet.

Another point in the management of a newly operated patient is the provision for some movement of the body, especially the placing of the patient on each side as often as twice daily, in order to prevent hypostatic pneumonia after ether. It was found in the case of the first man herein mentioned that he needed internal medication and constant attention on account of congestion of the lungs after the anesthetic.

To Dr. H. O. Marcy is due the credit of introducing to the profession the virtues of kangaroo tendon, and any mention of the methods employed in the operative treatment of hernia would be incomplete without a due acknowledgment of his original and painstaking work as a pioneer in the steps that have been taken for the radical care of hernia. It is unnecessary for me to reiterate before this audience the words of H. O. Marcy¹ some years ago before this association, but I do wish to say that his idea that "tendon suture is greatly to be preferred to catgut" has been tested, and the "kangaroo tendon has met with the unqualified approval of nearly every operator who has used it."

In the papers of both Dr. Coley and Dr. Halsted we find cases of hydrocele complicating hernia, while a hernia of the bladder and of the uterus itself are rare instances which have been encountered by them and others. It has been my aim to direct attention to the

¹ Transactions of the Southern Surg. and Gyn. Assoc., 1892.

coexistence of hernia, varicocele, and hydrocele, and to discover their mutual relations. Where there is an omental development such as this man had, it is practically impossible to tell when the intestine is reduced by taxis, but, on the other hand, the adhesions make a protecting wall of omentum, serving as a cushion to the delicate intestine in the inguinal canal.

Therefore, I conclude that it is a good rule, "When in doubt, operate." "When in doubt, operate" has been said to be the best rule in hernia, after having resorted to taxis.

There is a great deal of doubt right here in my mind as to how much effort should be made to reduce a hernia before operation is determined upon. I may say that while some surgeons advise only a few minutes of effort in this line, I used every possible means and nearly an hour before I came to the conclusion to desist.

T. S. K. Morton¹ took the position some years ago that castration might be adapted to cases of a certain character when operations for the radical cure of hernia were performed. He limited this plan to (1) certain cases of undescended testis, (2) some cases of congenital hernia, (3) certain cases of chronic or acute disease of the testis, (4) rare cases where traumatism has occurred to testis or cord, (5) in case of sloughing thereof, and (6) hernia in very aged persons.

In operations upon the testicle, the general appearance of the tissues should count for a good deal. It is unnecessary to make a microscopic examination until after the operation, when a specimen of the tissue may be submitted to the pathologist. The surgeon should be prepared to decide the question of castration by the naked-eye appearances of the tissues, being influenced by the presence or absence of a peculiar infiltration and discoloration of the testicle, as well as by the semblance of healthy tissue and a sufficient blood supply to give a healthy red color. Furthermore, the surgeon should examine the tissues for the presence of tuberculosis, which is much more likely to attack young subjects than is malignant disease. But I have frequently observed sarcoma and carcinoma of the testicle in children advanced to such a stage that operation was without avail. The beaded condition that develops along the spermatic cord in tuberculosis is quite characteristic, and scarcely to be mistaken

¹ Medical News, April 28, 1894.

for anything else. When a patient is over 40 years of age, the kidney should be examined for the presence of malignant disease. A sudden onset of symptoms at this time of life is to be regarded as suggestive of malignant disease.

Through the courtesy of Dr. Halsted I am enabled to reproduce the accompanying illustrations showing the steps of his operation for hernia. As remarked by Dr. Halsted,¹ the illustrations may be readily understood without additional explanation. Fig. 3 shows a special method of including in the suture the cremaster muscle, with a view to lend additional support to the intestine. Fig. 4 shows a further step in the procedure,—the Bassini-Halsted method of stitching to Poupart's ligament the internal oblique muscle, mobilized, and possibly further released by incising the anterior sheath of the rectus muscle. The conjoined tendon also is included in the suturing. Fig. 5 represents the completing of the muscular overlapping, whereby Poupart's ligament is joined with the aponeurosis of the external oblique muscle. The aponeurosis of the external oblique muscle is sometimes united over the internal oblique separately, as indicated in Fig. 6. Figs. 7 and 8 represent modifications to suit peculiar cases. Fig. 9 gives a good idea of the beginning of the operation.

¹ Johns Hopkins Hospital Bulletin, 1903, vol. xiv, p. 208.

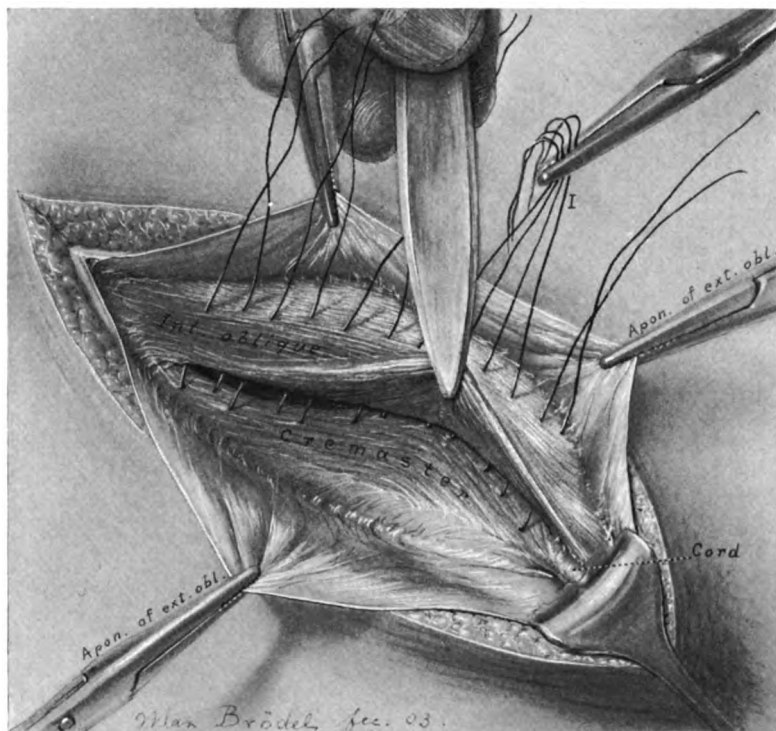


FIG. 3.—A special method of including the cremaster muscle in the suturing. (Halsted.)
 [Figs. 3 to 9 have been kindly lent by the editor of the Johns Hopkins Hospital Bulletin.]

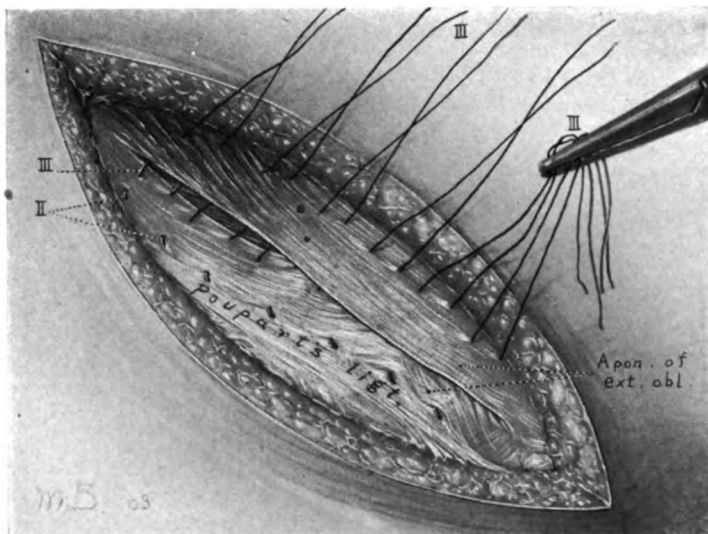


FIG. 4. A further step in the procedure,—the Bassini-Halsted method of stitching the internal oblique muscle to Poupart's ligament. Andrew's method so-called is part of Halsted's method.

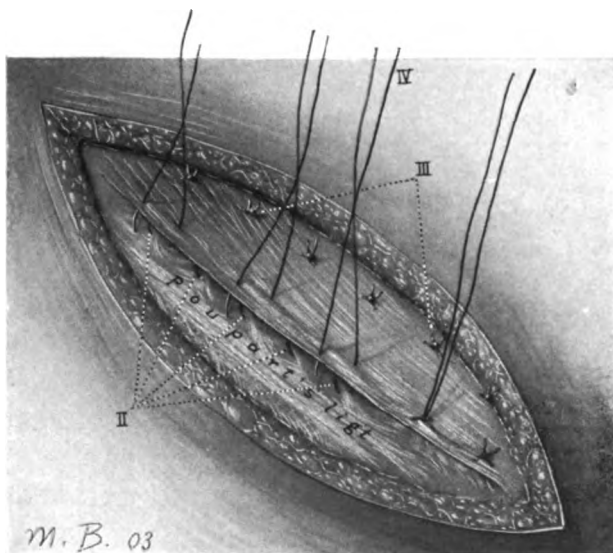


FIG. 5.—Completion of Halsted's method,—overlapping of external oblique. The success of the operation depends upon the anatomic relations. The dotted lines indicate the apposition of the surfaces which have been overlapped or doubled like a double-breasted waistcoat.

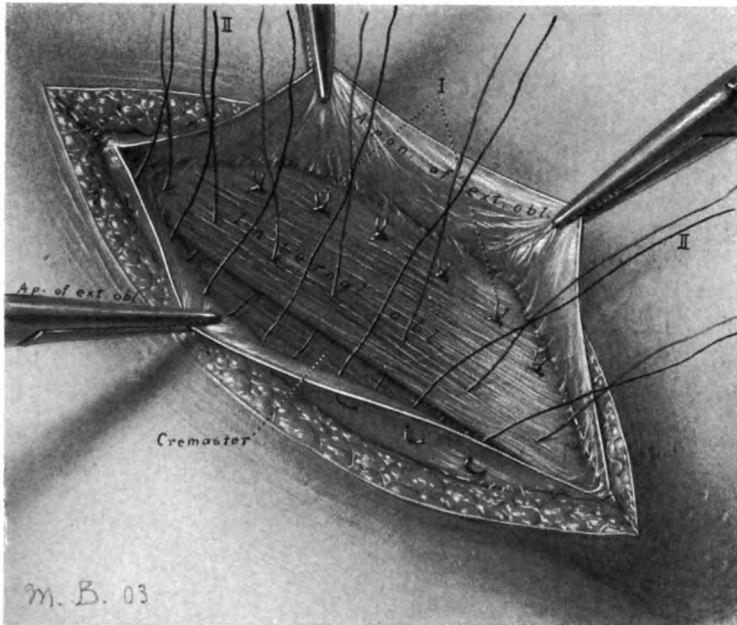


FIG. 6.—Bassini-Halsted method.

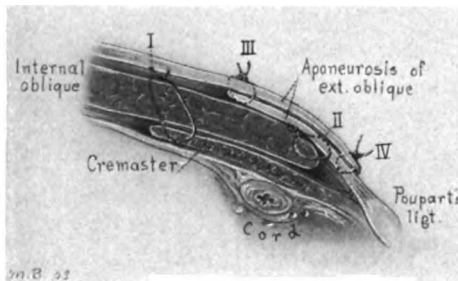


FIG. 7.—A cross-section after the completion of the Bassini-Halsted method, showing a distinct doubling of tissues accomplished at all points, and a trebling at points of needed strength.

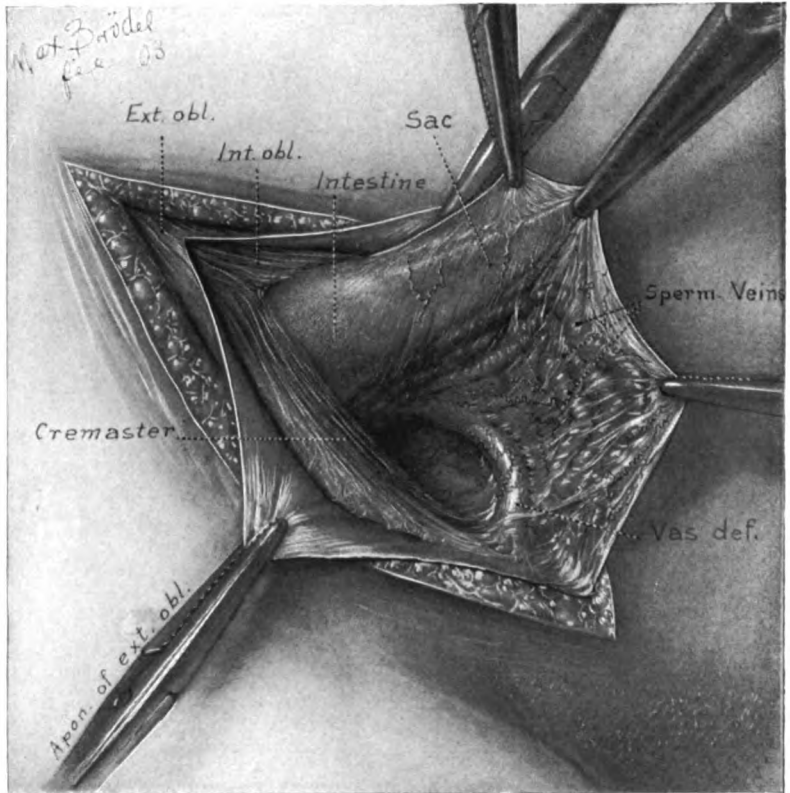


FIG. 8.—“The veins should be ligated as high up in the abdomen as possible.” (W. S. Halsted.)

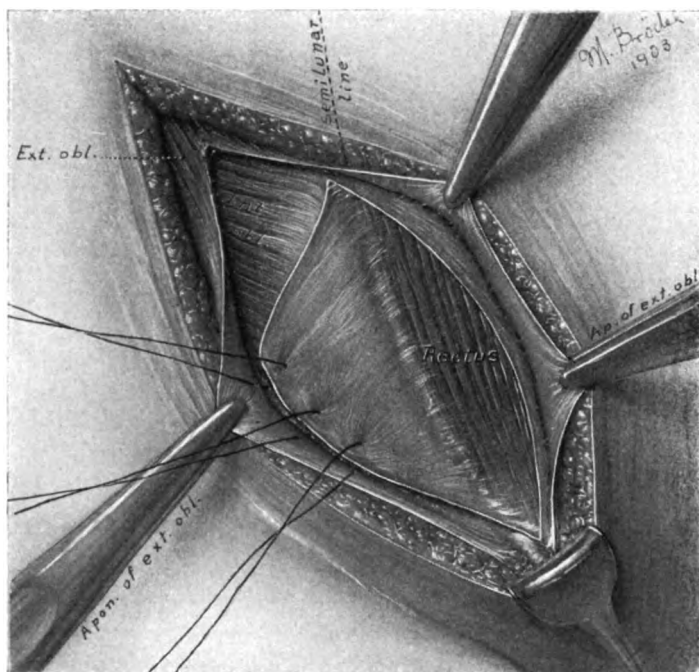


FIG. 9. - The incision extends from the point even with the anterior superior spinous process of the ilium to the external ring, nearly parallel to the external border of the semilunar line. Halsted method.

OBSERVATIONS UPON GASTRIC, INTESTINAL, AND LIVER SURGERY IN THE GERMAN CLINICS

BY CHARLES P. NOBLE, M.D.

Surgeon-in-Chief to the Kensington Hospital for Women, Philadelphia

DURING the past summer I had the opportunity of visiting the clinics of Professors Czerny, in Heidelberg, Körte, in Berlin, and Kehr, in Halberstadt, and of witnessing various operations upon the gastro-intestinal canal and bile ducts. It is my purpose to report these observations with some critical remarks.

Professor Czerny is the professor of surgery in the University of Heidelberg, of which he is pro-rector. He is one of the most distinguished of the veteran surgeons of Germany. Although past sixty years of age, he is very vigorous and active. Czerny's career has doubtless been influenced by the fact that he was the successor of Simon, and thus succeeded to a clinic in which a large proportion of gynecologic work was done. For this reason he had for years a training in abdominal surgery from the stand-point of the gynecologist. Czerny has been one of the pioneers in the development of the surgery of the stomach, intestines, and bile ducts. The following operations were witnessed:

Operation for Several Gall-Stones of the Gall-Bladder and Cystic Duct; Large Gall-Stone impacted in the Cystic near the Common Duct.—The operation was done with the patient almost horizontal, the shoulders being slightly elevated. No block was used under the back. Incision in the right rectus muscle about five inches in length; the gall-bladder region was packed off with gauze; the gall-bladder was opened and the stones removed with a scoop; exploration of the common duct by touch; partial closure of the gall-bladder wound with sutures; rubber drainage of the gall-bladder; attachment of the gall-bladder to the parietal peritoneum; closure of the abdominal wound with through-and-through silk sutures without drainage of the abdominal cavity. Czerny stated that he only extirpates the gall-bladder when it is

much diseased or shrunken. When he performs cholecystectomy, he uses drainage of the hepatic duct in certain cases.

Cystostomy and Drainage of the Gall-Bladder for Supposed Gall-Stones.—This patient was a man from St. Louis, who had left home with a diagnosis of cancer of the liver. He was jaundiced, and had had attacks of pain in the liver region with jaundice. The operation was undertaken with a diagnosis of gall-stones in the gall-bladder. The same method of operation was followed as in the previous case. The abdominal incision disclosed a gall-bladder of fairly normal appearance. Palpation of the common duct failed to reveal stones. The gall-bladder was opened and no stone found. Some débris, spoken of as "sand," was removed with the scoop. The operation was terminated with drainage of the gall-bladder as in the previous case. The revised diagnosis was cholecystitis. No evidences of cancer were found. The pathology disclosed by the operation is a sufficient commentary upon the uncertainties of diagnosis. However, the patient should feel amply repaid for his journey of four or five thousand miles to have the diagnosis of cancer corrected, and doubtless his jaundice and catarrh of the bile ducts and gall-bladder will be cured by the drainage of the gall-bladder and subsequent dietetic treatment.

In addition to the gall-bladder operations, I saw Czerny perform a hysterectomy for fibroids, and an amputation of the breast for cancer and chronic mastitis. The hysterectomy was done with the patient almost horizontal. In the removal of the breast the muscles were not removed. Czerny stated that he does not remove the pectoral muscles unless they are directly involved, because he does not believe that the results as to recurrence are sufficiently improved to compensate for the loss of function following the routine removal of the muscles.

A visit to the wards showed a number of patients convalescing from operation upon the gall-ducts and from gastro-enterostomy. Two of the gall-bladder operations had been cholecystectomies followed by drainage of the hepatic duct. I was told by one of the assistants that in performing gastro-enterostomy the posterior operation is done with the Murphy button, and without an entero-enterostomy. The experience in this clinic is that vomiting from the so-called vicious circle does not occur after the posterior operation, even though no entero-enterostomy is performed. A large number

of operations have been done with the Murphy button, and Czerny remains entirely satisfied with it. My recollection is that the number was stated as being one hundred and fifty.

There was nothing special to note about the methods of anti-sepsis and asepsis employed in this clinic. The patients were prepared for operation in the usual manner. Hand disinfection was by scrubbing with soap and water, followed by the use of alcohol and bichlorid solution. The hands when soiled during operation were washed in bichlorid solution and wiped with gauze before being introduced into the wound or abdominal cavity. No gloves were employed.

Silk is used for suture and ligature material within the abdomen. As a routine, through-and-through sutures of silk are used for closing the abdominal wall. In fat patients interrupted catgut sutures are used for the peritoneum, interrupted catgut for the fascia and muscle, and interrupted silkworm gut for the skin and fat.

Professor Körte, of Berlin, is one of the most distinguished surgeons, in middle life, in Germany, being especially known for his work in the surgery of the stomach, intestines, and bile ducts. He is surgeon to the Municipal Hospital of Berlin. The following operations were witnessed:

Resection of the Sigmoid for Cancer with Stricture.—A colostomy had previously been done by another surgeon. The operation was begun by carefully cleaning, plugging, and stitching the artificial anus, to prevent soiling of the field of operation. The abdomen was then recleaned and opened in the middle line. The sigmoid was delivered, preliminary ligation of mesentery carried out, proximal and distal clamps on the bowel placed, followed by careful packing of the abdomen and region of the wound to prevent soiling. Then two additional clamps were placed upon the portion of the bowel to be removed, and the bowel resected. The proximal and distal portions of the bowel were then carefully cleansed of mucus and bowel contents. Suturing of the bowel was begun by placing a few interrupted linen (or silk) sutures from within outward near the mesenteric border. Then two interrupted silk sutures were placed from without inward equidistant from the first. This was followed by two rows of continuous Lembert silk sutures to close the remainder of the wound; and this by stitching convenient fat processes over the wound, to serve as a series of grafts, by inter-

rupted sutures. The bowel was then carefully cleansed, the abdominal packing removed, and the abdominal wound closed.

Operation for Chronic Appendicitis.—The operation consisted in an incision of three and one-half inches over the right rectus muscle and through its external sheath; the detachment of the rectus inward; a shorter incision through the posterior sheath and peritoneum; the delivery of the head of the colon and some ileum; ligation of the vermiform appendix one-third of an inch from the cecum with catgut; ligation of the meso-appendix; and amputation of the appendix and of the mesentery with the thermocautery. The stump of the appendix was turned in with a number of interrupted catgut sutures, and this was followed by a row of continuous catgut sutures. The abdominal wall was closed with interrupted linen (or silk) sutures, and two rows of buried interrupted catgut sutures in the peritoneum and fascia. Körte employs a special needle, very much like a large Reverdin needle, for introducing through-and-through sutures. The needle has a spool of suture material in the handle and is threaded through the eye, as in the Reverdin needle. After the needle is passed through the wound, the suture is held and drawn off the spool while the needle is withdrawn.

Gastro-Enterostomy and Entero-Enterostomy for Multiple Cicatrices in the Stomach.—A long median incision was made above the umbilicus. The stomach was much dilated and irregular in shape, owing to the various cicatrices. The colon was drawn forward, the mesocolon torn, the posterior wall of the stomach drawn through the opening in the mesentery, and an ample fold of stomach caught with a pair of Doyen forceps. The edges of the torn mesentery were then sutured to the stomach wall. The small intestine was then caught in a second pair of Doyen forceps, so that the handles of the forceps should be opposite the first pair when the stomach and bowel were brought up into the abdominal wound. The peritoneum was then packed off with gauze, and this was further protected by fastening a piece of sterilized water-proof batiste under the forceps and over the gauze, in this way thoroughly protecting the peritoneal cavity and the abdominal wound. The intestine and stomach were then sutured with a running linen (or silk) suture for a distance of about two inches. The bowel and stomach were then incised, and that portion of each outside the grasp of the forceps was carefully dried and cleansed. A second row of continuous sutures united the

muscularis and mucosa of the stomach and bowel. A similar continuous suture united the muscularis and mucosa of the opposite side of the wound, and this was followed by a continuous suture uniting the peritoneum. Special sutures were introduced to reinforce the end of the line of suturing at each end of the wound. The stomach and intestines were then cleansed, the clamps removed, and the parts allowed to drop back into position. This was followed by an entero-enterostomy, in which the same technic was employed.

The asepsis observed in Körte's clinic presented a few points out of the ordinary. The nail-brush is used less than usual, and instead gauze or other absorbent material is used to serve the purpose of the domestic "wash-rag." During operations, also, the hands when soiled were washed with wet absorbent cotton instead of in the usual manner. Absorbent cotton was freely used also to wipe away discharges from the wound during operations. From the mechanical stand-point this impressed me as having a distinct advantage, particularly in dealing with the class of septic and discharging wounds with which the general surgeon has so much to do, such as abscesses, diseased bone, etc.

As an operator, Körte is rapid and systematic in his movements and very careful in the protection of the field of operation from infection. The technic of gastro-enterostomy as performed by him is beyond criticism. The technic of his appendicitis operation is that generally employed in Germany, with the exception of the use of the cautery. As compared with the operation in America, the incision is longer, and the method of burying the stump is more tedious, and requires the use of more sutures than when a mattress suture or purse-string suture is used for burying the appendix.

My next visit was to the private clinic of Professor Hans Kehr, in Halberstadt. Professor Kehr's career has been phenomenal. Although not connected with any of the German universities, he has risen to the highest rank among the German surgeons, and although scarcely more than forty years of age and living in a small city relatively removed from the larger centers of population, he has so developed the specialty of the surgery of the bile ducts that he has had the largest experience of any single surgeon in the world in this department of surgery. A visit to Professor Kehr's clinic is quite different from a visit to any of the other well-known surgeons in Germany. The other men almost without exception are con-

nected with a university organization and work in the large cities, so that one's time can be divided between various clinics and the attractions of a large city. One visits Halberstadt for the purpose of witnessing Kehr's work, though the town itself has a number of historical buildings and is contiguous to the Hartz Mountains and the historical cities of Gosslar, Quedlinburg, Braunschweig, etc. The following operations were witnessed:

Operation for Chronic Obstruction of the Common Duct; Twenty-Five Stones in the Gall-Bladder, Three in the Common Duct; Cystectomy; Drainage of the Hepatic Duct.—This operation would serve as a type of those which I have seen Kehr perform in which it was necessary to open the common duct. The patient was anesthetized by chloroform administered by the Roth-Dräger oxygen-chloroform apparatus. She was placed upon the Kehr table with the feet slightly higher than the head and a block under the back. The incision began at a point near the ensiform cartilage, extending downward and outward, gradually crossing the right rectus muscle to a point near its outer border and near the plane of the umbilicus. At times the incision extended sufficiently to the right to enter the oblique muscles. All bleeding points were either seized with forceps or ligated. The long incision affords free access to the region of the gall-bladder and common duct. To assist in traction upon the wound, Mikulicz forceps were applied to the peritoneum and posterior sheath of the rectus muscle upon each side, so that by drawing upon the handles of the forceps the abdominal wound could be drawn open. After inspection of the field of operation, the stomach and colon were held out of the way by laying a large pad of gauze over them, which extended from the depths of the peritoneal cavity out through the wound. By pressure upon this with one hand, the assistant was able to keep the wound open and to keep the bowels out of the field of operation. A pad on the opposite side of the wound served the same purpose to keep the colon or other intestines from appearing from below and the right. Inspection and palpation determined the presence of stones in the gall-bladder and in the common duct. The gall-bladder was aspirated and the bile removed. The opening in the gall-bladder was then closed with a clamp forceps. Traction made upon the gall-bladder partly delivered the liver into the wound. With a knife the gall-bladder was detached from its bed in the liver and bleeding points secured with

forceps. The spouting cystic artery was likewise caught and ligated. The dissection continued until the gall-bladder was free from the liver and attached by the cystic duct to the common duct. It was then ligated with silk and removed. (In another case the common duct was opened by extending an incision from the cystic duct inward toward the intestinal end of the duct.) The common duct was opened, and with the ordinary polypus forceps used by the rhinologists the stones were seized and removed from the common duct. This was further examined by palpation and by the use of the sound. A rubber tube was then inserted through the incision in the common duct up into the hepatic duct, and the wound in the common duct was closed with interrupted silk sutures. A drainage tube was selected of the size of the caliber of the common duct and long enough to reach to a vessel alongside the bed. During the operation any fluids were removed by absorption with dry gauze. No packing was employed; if the pads became soiled, fresh ones were substituted. All the ligatures were left long. After a careful toilet of the region of the operation, strips of folded absorbent gauze were packed about the field of operation, one below and to the outside of the incision in the common duct, one in the bed of the liver, one to the inside and above the incision in the common duct. In every operation the border of the liver is stitched to the abdominal wound to secure adhesion for the purpose of preventing suppuration between the liver and diaphragm. Then the abdominal wound was closed with through-and-through silk sutures introduced from within outward. No buried sutures were employed in closing the abdominal wall. Time of operation, one hour.

Cystectomy for Stones in the Gall-Bladder.—The usual incision gave access to the region of the bile ducts. The gall-bladder was found moderately adherent to the omentum. The adhesions were slightly separated. Palpation of the common duct disclosed no stone. The gall-bladder was aspirated and separated from its bed in the liver by dissection with a knife. A curious diverticulum of the gall-bladder extended into the foramen of Winslow. The artery of the cystic duct was cut so close to the deeper vessels that it could not be ligated in the usual manner by catching it with a Koenig forceps and ligating under the forceps, therefore the Koenig forceps was allowed to remain. The cystic duct was ligated and the gall-bladder removed. In this case, also, the vermiform appendix, the

seat of chronic inflammation, was removed. The usual gauze packing was placed, and the abdomen closed as in the first place. Time of operation, thirty-five minutes.

Cystectomy and Drainage of the Hepatic Duct for Stone in the Ampulla of Vater; Stone removed through the Duodenum.—This patient was a man, who had a long-standing history of attacks due to obstruction of the common duct and to infection of the bile ducts. One attack had been followed by general septicemia, endocarditis, and septic inflammation of the kidneys. Jaundice had been present for a year. The gall-bladder was markedly adherent to the omentum, the colon, the duodenum, and the stomach. The liver also was adherent to the diaphragm from the preceding perihepatitis. The gall-bladder was thickened and contracted, and presented a diverticulum at the border of the liver. The ligamentum hepaticoduodenalis was shortened and densely adherent. The operation of cystectomy proceeded as in the former cases. After removing the gall-bladder, the common duct was opened and explored, and a large stone located in the ampulla of Vater. It was of such a size that it could not be displaced backward along the common duct, so as to be removed through the operation wound in the common duct; instead, the common duct was seized with the fingers in such a manner as to deliver it and the duodenum into the wound, in which position the stone, duct, and duodenum were held in the left hand of the surgeon. A longitudinal incision was then made through the presenting surface of the duodenum and into the common duct. The stone was then removed through the duodenum. The duct being still held by the surgeon's hand, the edges of the bowel and common duct were seized with Koenig forceps, and a number of interrupted silk sutures passed to fasten the wall of the duct to that of the duodenum. These sutures were tied, and then only was the common duct allowed to drop back into the abdomen. The opening in the duodenum was then closed by interrupted silk sutures passed in the direction of the incision, that is longitudinally, and this was followed by a second row of Lembert sutures. The bowel was then cleansed and dropped back into the abdomen. The field of operation was carefully cleansed, a drainage tube passed into the hepatic duct, and the wound in the common duct sutured as in the preceding cases. Raw points where adhesions had been separated along the duodenum were then covered over by grafts from the omentum,

because the bowel had been opened and the field of operation had probably been infected. On this account, also, a more extensive gauze drainage was employed than usual. Time of operation, ninety minutes.

Cystectomy for Cholecystitis with Adhesions; Vermiform Appendix removed for Chronic Appendicitis.—The patient, a woman, had suffered from recurrent attacks of pain both in the region of the gall-bladder and near McBurney's point. The pain was clearly due to the presence of adhesions. No stones were present. The cystectomy was performed in accordance with the technic already described. The method of removing the appendix employed by Kehr is similar to that employed by other German surgeons. The practice of first cutting the meso-appendix and then seizing the vessels was followed. This necessitated the placing of a number of ligatures instead of one or two, as is done by American surgeons. After freeing the appendix from its mesentery, the appendix was ligated and amputated. The stump was buried by means of two rows of interrupted Lembert sutures. Silk was used throughout. As a result, much more suture material was buried about the head of cecum than is the case in the operation after the technic employed in America. Time of the two operations, fifty minutes.

The Roux Operation for Vomiting following Gastro-Enterostomy and Entero-Enterostomy.—The patient, a woman, had been operated upon by a well-known German surgeon. The bowel had been stitched to the anterior wall of the stomach. In addition to the gastro-enterostomy, an entero-enterostomy had been performed. This operation was followed by regurgitation of bile into the stomach, and the patient had been much troubled by the vomiting of bile. The long median incision was made, exposing the organs involved. Very extensive but not very dense adhesions were found between the abdominal wall, stomach, omentum, and intestine. After the organs involved were freed by the separation of adhesions, it was found that the cause of the vomiting was that in performing the gastro-enterostomy the loop of bowel had not been turned over, hence that the intestinal current was opposed to that of the stomach. It was therefore decided to do the Roux operation. This consisted in dividing the stomach at its pyloric end and closing the pyloric end of the stomach and the upper end of the duodenum. This was followed by excising the afferent loop of bowel between the entero-enterostomy

opening and the gastro-enterostomy opening. The result of this operation was to leave the two arms of a Y. Down the left arm of the Y the contents of the stomach passed into the small bowel, and down the right arm of the Y the bile and pancreatic juice reached the intestine. The operation was a prolonged one, although my notes do not state the exact time. All of the patients made good recoveries.

In addition to these operations upon the bile ducts and the alimentary canal, there were two exploratory sections for cancer of the abdominal organs; a radical operation for cancer of the breast, in which the muscles and all the tissues down to the ribs were removed, and the axilla cleaned out as high as the clavicle; the radical removal of the glands of the neck for tubercular disease; and an operation for compound fracture of the bones about the wrist. The above operations were seen in a visit of six days.

In addition to these operations seen in Halberstadt, I had the opportunity of witnessing Kehr perform in Philadelphia five abdominal sections for various morbid conditions of the bile ducts.

This description of the work seen in Professor Kehr's clinic would be very incomplete without some mention of the character of the clinic itself, of the methods of asepsis and suture materials in use, and also a discussion of the after-treatment employed. Professor Kehr operates in a private hospital containing about forty beds. According to the German fashion, the accommodations are described as first, second, and third class. The hospital is thoroughly equipped for its work. The operating staff consists of two medical assistants and two specially trained nurses. Hand disinfection consists in the prolonged scrubbing of the hands and arms with soap and water and a brush, mechanical cleansing of the subungual spaces, scrubbing with *seifen spiritus* (of the German pharmacopeia), followed by a thorough washing of the hands in alcohol, which is applied by means of rubbing with gauze. Forty minutes is consumed in the process. If more than one operation is done, exactly the same process is repeated before the second operation. Kehr operates with one assistant and one nurse, besides the anesthetist. The patient's abdomen is prepared upon the operating table. The preliminary scrubbing and shaving are done by the orderly. This is followed by scrubbing the abdomen with soap and water, alcohol, and bichlorid solution. Bichlorid solution is used for the abdominal

wall, but not for the hands. The sterilizing of the instruments and dressings presents nothing specially interesting, except that the boiler for the instruments is so made that the soda solution is allowed to run out after the instruments are boiled, and these are handed direct from the boiler to the surgeon; thus the possibility of contamination is reduced to the minimum in so far as the number of the assistants and the handling of the instruments are concerned.

The salient features which impress themselves upon the observer in watching Kehr's operations upon the bile ducts are: (1) The use of a very long curvilinear incision. (2) The use of silk sutures and ligatures—the ligatures and sutures in the bile ducts are invariably left long so that the ends protrude through the abdominal wound. The size of the suture and ligature material is relatively heavy. (3) The closure of the long abdominal wound with a small number of through-and-through sutures. For an incision twelve inches in length five or six deep sutures are used, with superficial ones for the skin. The observer is at once impressed with the systematic character of the operative technic. Each step in the operation accomplishes its definite purpose, so that without haste the operation is completed in a relatively short time. Kehr's manipulative dexterity and thorough familiarity with his work are promptly apparent, and there is no difficulty in appreciating the basis for his world-wide reputation.

Certain points in the technic are so different from those employed by American abdominal surgeons, and especially by the gynecologists, that they afford a profitable subject for discussion. At first sight the incision seems unnecessarily long, and its direction across the fibers of the rectus muscle and even into the oblique muscles seems open to the objection that it unnecessarily weakens the abdominal wall. However, Kehr has employed the more usual incision parallel with the fibers of the rectus, and has abandoned it for the present incision on the ground that it facilitates the manipulative steps of the operation, and certainly his opinion based upon his immense experience is entitled to full consideration. He states that in 18 per cent. of the cases in which he has opened the common duct to remove stones and employed drainage of the hepatic duct, that subsequently in washing out the duct other stones have been removed. The question is, if he with his large experience and the advantage of a very free incision will overlook stones in at least

18 per cent. of the cases, in what percentage of cases of stone in the common duct will other surgeons overlook stones with a shorter incision? The fact that he uses but a single assistant would seem, however, at least a partial explanation of his preference for the long incision, as he can thus eliminate the use of retractors, which must be held by a second assistant. The usual rule to make a moderate incision, to be extended if necessary, will appeal to many operators in liver surgery as well as in the surgery of other parts of the body.

The use of silk for sutures and ligatures, the ends of which are left long protruding from the abdominal wound, at first sight seems a return to the surgery of pre-antiseptic days. A little consideration, however, shows that this objection is much more theoretical than real. All the cases are drained with gauze, and when the gauze is removed, the ligatures and sutures in the ducts are loose and come away with the gauze, so that the long ends simply serve as one of the means of drainage. One trained in the use of the tier method of closing the abdominal wound cannot look with satisfaction on the closure of an abdominal wound twelve inches long with five or six deep sutures, as the method seems to invite the occurrence of hernia. In this connection, Kehr states that hernias are not common, and that the explanation is: (1) That the incision is in the upper portion of the abdomen, usually above the umbilicus, where hernia is much less apt to occur than below the umbilicus. (2) That most of the patients are women, and that the wearing of corsets is a good protection against hernia above the umbilicus. (3) That the line of union obtained by the method of suture is not as weak, or certainly no weaker, than the point where the gauze drain is employed. The method has in its favor the fact that it is much more rapidly completed, and thus the time of operation is shortened. Many surgeons will undoubtedly substitute silkworm gut for silk for the through-and-through sutures, and will suture the external sheath of the rectus with a continuous suture of chromicized catgut, at least as far as the drainage opening, which will add but a very few minutes to the length of the operation. The gauze packing is allowed to remain for two weeks, at the end of which time it is removed, together with the ligatures and sutures in the ducts which may be loose. The sutures in the abdominal wall are removed at the same time.

The chief differences in the after-treatment in this clinic as compared with that with which we are familiar are that strychnin and digitalis are employed but little, if at all; that calomel is not used as a purgative; that no effort is made to have the bowels moved until the fifth day, when the patient is given castor oil; and that the greatest reliance is placed upon the washing out of the stomach to relieve any unfavorable symptoms such as vomiting or distention. The after-dressings of all patients are carried out in the septic operating room, where the patients are brought on ward carriages and placed upon a table for the dressing. It is in this connection that perhaps the only legitimate criticism of the methods in use in the clinic can be made. The surgeon and the assistants make the dressings, and do so with their bare hands. As the prevention of infection is better than its destruction, the introduction of rubber gloves or the assignment of the septic dressings to the anesthetist would certainly tend to lessen the risks of sepsis from infection from the hands of the operator and his immediate assistant.

I was very courteously given the opportunity to see not only the operations, but to see the patients in the wards and private rooms almost daily, and to see all the after dressings. There can be no higher compliment paid to the character of the work observed than that there was so much to admire and so little to criticise.

A NEW SURGICAL MALLET

BY FREDERIC GRIFFITH

Fellow of the New York Academy of Medicine

THE perfect mallet for the surgeon's use should either absorb or transmit vibration following impact away from the struck surface; the amount of jar following a blow becoming an important factor in the production of shock if not directly giving rise to injury

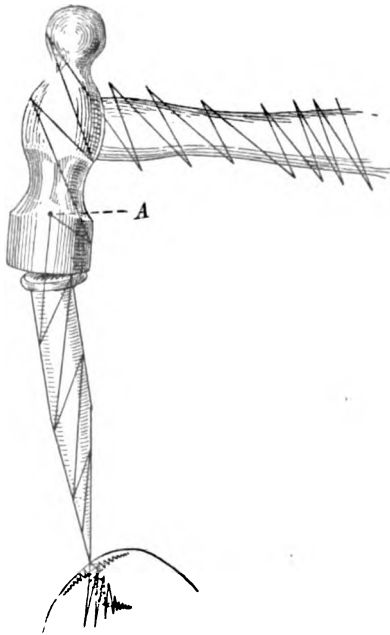


FIG. 1.—Illustrating the force projection following a true blow with an iron- or a steel-headed hammer.

of subjacent parts. The objection to a forged iron- or steel-headed hammer for the surgeon's use lies in the character of the force projected from the cutting edge of the chisel against the bone. Owing to the compactness and hardness of the molecular structure of such a hammer-head the blow projected onward has a shattering rather than a cutting force. This may be shown diagrammatically, the

effect of jar being more pronounced when a blow is false than when true or fairly struck, velocity being constant.

Fig. 1 represents the force projection following a fair or true blow struck with an iron- or steel-headed hammer. (A) may be called the force center and represents a point near the striking face in a well-balanced tool. Here the cutting force is at a maximum as shown by the long waved, longitudinal vibrations, while the shattering force

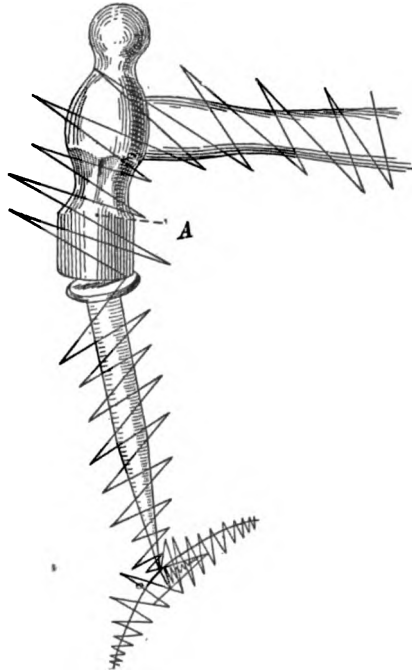


FIG. 2.—Illustrating the force projection following a false blow with an iron- or a steel-headed hammer.

shown by transverse vibrations is at the minimum. For bone-work, particularly upon the skull, there is danger from both of these forces,—namely, that the cutting force will be in excess and act directly upon the soft tissues in addition to the jar of the shattering force. Shattering or bursting force produced by a blow perhaps may be best understood by mentioning the term used by sculptors, who in describing it would say that such a blow “stunned” the marble.

Fig. 2 represents the force projection following a false blow with the same hammer. Shattering vibrations are at the maximum,

cutting vibrations are at the minimum of power, the direction of forces being outside the force center (A). Lead from its power of deadening the blow (absorption of vibration) becomes useful as a substitute, but as generally made the sheathed leaden head is not well balanced to the handle; in addition the handle being of necessity made from a different metal obstructs the escape of vibration by way of the surgeon's arm.

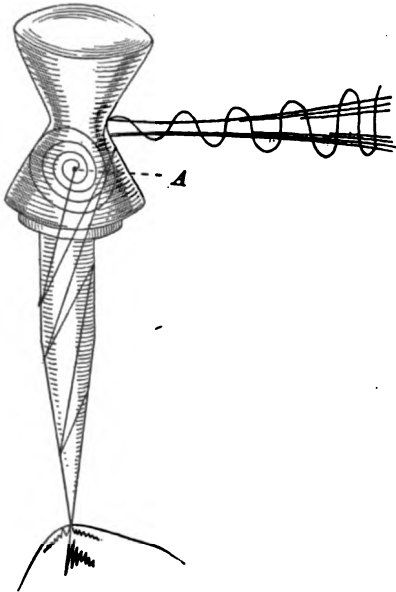


FIG. 3.—Illustrating the vibrations in a leaden mallet.

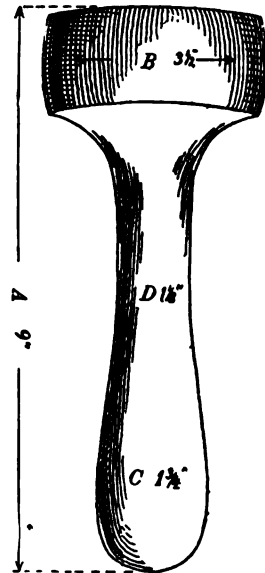


FIG. 4.—The author's new mallet made of selected beech-wood.

Fig. 3 represents the vibrations in a leaden mallet. Owing to the weight factor a good balance cannot be struck between the head and handle in this implement.

Of all the metals aluminum seems to approach nearest to the requirements. An instrument constructed from this material should be one solid piece of head and handle, which will necessitate a form for the implement somewhat similar to the illustration for the wooden mallet now to be described. This instrument may be likened in form to the old-fashioned, wooden potato-masher, and the idea of having the head and handle of one piece came from a mallet which I saw in Zürich, Switzerland.

It should be made from a selected piece of well-seasoned and close-grained wood free from knots, such as locust or beech-wood. The specimen which I made was from the latter wood (Fig. 4). Turned or finished by hand the dimensions should be: length (A) 9 inches; diameter of head at greatest expanse (B), $3\frac{1}{2}$ inches from which it tapers gradually in both directions, thus enabling a "fair" blow to be struck with greater certainty. The head is shaped down to meet the handle in a free curve. The handle at its greatest diameter (C) is $1\frac{3}{4}$ inches, tapering to meet the curve toward the head (D) at $1\frac{1}{2}$ inches.

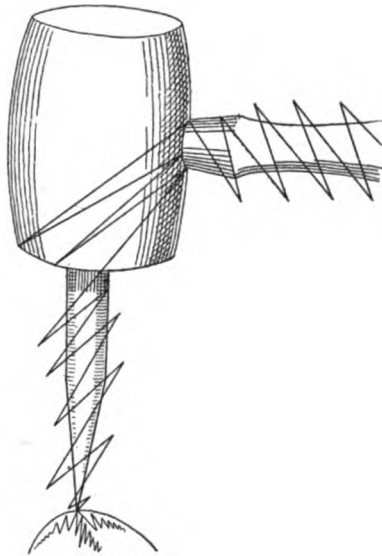


FIG. 5.—Illustrating the vibration projection in an ordinary carpenter's mallet.

In a comparison between the ordinary small-sized carpenter's mallet and the one-pieced mallet I have found that the jar is more directly backward in the one-pieced mallet (partaking of the nature of direct recoil in this instance) than in the jointed.

Fig. 5 represents the vibration projection in an ordinary carpenter's mallet, showing obstruction at the junction of the head and handle.

Fig. 6 shows the new surgical beech-wood mallet and the vibration projection unimpeded through the head to the handle and thence onward to the surgeon's arm.

Regarding durability, every blow struck by a leaden mallet tends to destroy its shape. Rawhide heads are likewise soon rendered shapeless by technical boiling; the jointed wooden mallet

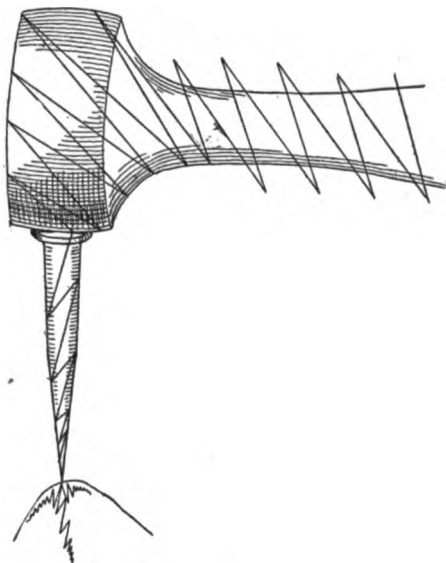


FIG. 6.—Illustrating the unimpeded vibration projection by the use of the author's mallet.

becomes liable to come apart from the same cause. While the necessary sterilization by boiling tends to open the grain in the one-pieced mallet which I have described, the application of a little oil worked into the wood overcomes this tendency.

Gynecology

THE NON-OPERATIVE TREATMENT OF INFLAMMATIONS OF THE GENITAL TRACT

BY FRANCIS H. DAVENPORT, M.D.

Assistant Professor of Gynecology, Harvard University Medical School, Boston

THE non-operative treatment of inflammations of the female genital tract is a very broad subject, covering so much ground that much of it must be treated very cursorily. The primary object of these papers is to emphasize the importance of non-operative treatment, so-called minor gynecology, which as a result of the development of surgical methods, and the glamour attached to them, has tended to fall into neglect.

From the nature of the case this tendency has been much less marked as regards the diseases which form the subject of this paper than in other branches of gynecology. The trend of practice here has been in the main logical. The old pathology of 25 years ago, which explained a large part of the inflammatory affections of the pelvic organs as pelvic cellulitis, gave way to the correct interpretation of the phenomena, as due to salpingitis and pelvic peritonitis. Their relief and cure by operation, either abdominal or vaginal, solved the problem of their treatment, and this method holds its own to-day as the best. Nor has there been much tendency to over-zealousness in this regard on the part of the leading gynecologists.

The inflammations of the vagina have never been treated operatively, and those of the uterus in one way only, by curetting. There is, therefore, a substantial unanimity of opinion among leading gynecologists as to the relative value of operative and non-operative measures in the treatment of these affections, and there is no need of a special plea in behalf of one or the other.

My task, therefore, will be in this paper to give as clearly as can be the most effective methods of local treatment, the details of

their application, their limitations, and the results which may be expected from them.

Inflammations of the genital tract may be considered as a single process. This tract, beginning at the vulva, extends through the vagina to the uterus, through this organ to the Fallopian tubes, which open directly through their abdominal end into the peritoneal cavity. This may be considered one long route, differing in its various parts anatomically, and hence showing different manifestations when inflamed, but essentially one. For practical purposes, and I firmly believe with the rarest exceptions, all inflammations of this varied canal are the result of infection. The particular bacteria concerned in their production are known in a large proportion of cases. In others, in which the particular germ cannot be recognized, it is fair to assume that the indifferent bacteria which are always found in the vagina may become active in the production of inflammation owing to some change in the soil in which they are implanted. Mechanical irritation of the vagina, or uterus, chronic congestion of these parts, or some alteration in the general condition of the patient, may so alter the mucous surfaces that these germs become pathogenic. In some such way we are obliged to explain the occurrence of vaginitis and endocervicitis in young women with intact hymen, in which the possibility of infection from outside may be definitely excluded.

There are in the female genital tract certain anatomic conditions present which are of importance in the consideration of the course of the inflammatory affections of the different parts. It may in general be said that the less complicated the structure the shorter is the course of the disease and the more readily it yields to treatment. If we take as a type the gonorrheal infection, we find that it usually shows itself first in the vagina. Sometimes it may simultaneously affect the uterus, but usually not. The vagina is lined with squamous epithelium, has a comparatively smooth surface, and though this is thrown into folds with depressions between, yet these are not deep, and when distended with moderate force become obliterated. These are conditions which favor a short course for any acute inflammatory disease, and we find that an acute gonorrheal vaginitis is usually easily cured. At the same time, there are in the vagina certain areas where the rugæ are more pronounced, or the layer of epithelium is thinner, where the disease tends to lurk, if at

all. Such are the cul-de-sacs of the vagina, the sides of the vagina low down near the outlet, and on the anterior wall opposite the neck of the bladder and the urethra. In these places the folds are larger and firmer, and less easily reached by remedial measures.

The anatomic conditions of the cervical canal afford another very marked instance of this general fact. There are four ridges running longitudinally from which numerous smaller ridges extend obliquely, and between which are deep depressions or crypts. The glands which lie at the bottom of these crypts are exceedingly difficult to reach by ordinary methods of treatment, and in them the gonococci may remain for an indefinite time, keeping up a low grade of inflammation which is hard to cure. If the inflammation extends to the corporeal endometrium, we have as an additional reason for the obstinacy of the affection the fact that the farther the disease is situated from the vagina the more difficult it becomes to treat it locally. This becomes even more apparent when the inflammatory process invades the tubes or peritoneum, direct treatment of which is impossible.

With this brief preliminary statement of certain general principles the way is clear for the consideration of the treatment of the various inflammatory affections as they manifest themselves in the different localities. I shall not go into the pathology of inflammations of the genital tract, nor describe the rare forms or complications met with, but confine myself to the common every-day affections which every general practitioner sees. Nor shall I have much to say of the symptomatology, which is very limited and simple, and belongs to the A B C of gynecology.

Let us then start at the beginning and consider the treatment of the inflammations as they manifest themselves in the different portions of the genital tract,—vulva, vagina, uterus (both cervix and body), tubes, and peritoneum.

As a type I shall take the gonorrheal infection. This finds its justification in the fact that it is the most common form of inflammation, and the methods of treatment for its relief are applicable to all forms.

Inflammation of the vulva is, except in children, more often secondary than primary. It follows infection of the vagina in the gonorrheal cases, and is usually of short duration. It would be of comparatively little importance were it not for the tendency of the

gonococcus to invade certain situations difficult to reach. These are the urethra, Skene's ducts, the vulvovaginal glands, and in some forms the hair follicles. Simple catarrhal vulvitis occurs most often in children, but occasionally in adults, in whom the predisposing factors are chronic congestion, obesity, and filth. Sometimes the discharge from the uterus or vagina, which ordinarily is innocuous, takes on irritating properties from some unknown cause and causes a vulvitis. The whole secret of the treatment of vulvitis may be summed up in two words,—rest and cleanliness. The importance of the first is too often underestimated. There is always some swelling of the labia, and moving about not only keeps up the irritation from friction, but spreads the infecting material into the urethra and the ducts of the glands. Rest in bed with the thighs apart will materially shorten most attacks. Measures to insure cleanliness will include relief to irritation and antisepsis. The discharge should be removed at frequent intervals, the frequency varying with the degree of inflammation. To remove the discharge the parts should be thoroughly irrigated with some antiseptic solution, such as corrosive sublimate, 1 to 4000, or potassium permanganate, 1 dram (4 grams) to a quart (liter). If the vagina is affected, these solutions may be used in the form of a douche, but in addition the whole vulva should be irrigated, the parts being separated, so that the folds of the labia minora and the surfaces of the labia majora shall be thoroughly treated. If the vagina is not affected, it should be left severely alone. To allay the irritation and to absorb the discharge, pads of gauze saturated with a wash of lead acetate should be laid against the introitus, between the labia, and changed frequently. If there is much pain, a dram (4 c.c.) of laudanum may be added to a pint (500 c.c.) of the lead wash. These simple measures will usually relieve the acute symptoms in a few days.

Occasionally the vulvitis becomes chronic, and the prominent symptoms are irritation and itching, particularly the latter. For this condition there is no remedy which will help so generally as silver nitrate; in fact, I consider it the best remedial agent we have in all chronic inflammations of the genital tract which can be reached. I keep on hand solutions of silver nitrate of four different strengths,—2, 5, 10, and 20 grains to the ounce (0.4, 1, 2, and 4 per cent.),—and use them according to the different conditions present. When the inflammation is recent and the parts still red and sensitive,

the weaker solutions should be used, gradually advancing to the stronger ones as the condition of the parts warrants. When itching is the sole symptom and the parts are indurated from long-continued scratching, the 20-grain (4 per cent.) solution, and even stronger ones, may be used.

Let us now consider the treatment of acute vaginitis. The principles which I laid down as governing the treatment of vulvitis—that is, rest and cleanliness—apply here as well, and it only remains to describe how these conditions may be secured in the vagina.

Rest in bed is important if we wish to limit the disease as much as possible, not, as is the case in vulvitis, on account of the friction, but because exercise favors hyperemia of the parts. Cleanliness, under which term is also included antisepsis, may be fairly well secured by douches *if properly given*. In order to secure the most perfect cleanliness the vagina must be distended with water, which can only be managed by having the hips higher than the shoulders. The water then smooths out the folds of the canal and bathes every part of it. The second essential is that the water should be hot. Hot water contracts the blood-vessels and relieves the hyperemia. Prolonged heat is necessary for this; so as the third requisite the douche should be of sufficient quantity to require 10 to 20 minutes for its application. This presupposes several quarts, and its slow escape. One, two, or three of these douches should be given in 24 hours, according to the severity of the inflammation,—and they had better be of plain water. The medicated douche should follow this, as it will be more efficacious when the vaginal walls are thoroughly clean.

There are a number of substances which may be used as a supplementary douche in these cases; the simplest is borax in the proportion of 1 dram (4 grams) to a quart (1 liter) of water; this is less irritating than some of the others, and should be used when the inflammation is acute. Later, astringents may be used, as alum, 1 dram (4 grams) to a quart (1 liter), or zinc sulphate, $\frac{1}{2}$ dram (2 grams) to 2 quarts (2 liters), or creolin, 15 to 30 drops to a quart of water. Corrosive sublimate, in the proportion of 1 to 500, is also of value in these cases. Usually the acute symptoms disappear within a week. If they fail to do so, and there still persists a purulent discharge, the best remedy to use is silver nitrate. We may begin with a fairly strong solution, 10 grains to the ounce (2 per

cent.), increasing, according to the tolerance of the patient, to 20 or 30 grains (4 to 6 per cent.). This is best applied with the cotton stick, care being taken to treat thoroughly every portion of the vagina. The cul-de-sacs should be carefully gone over, as they are places where the disease is apt to lurk. Both in the acute and chronic stages, it is wise to separate the vaginal walls with cotton or wool packing after the various medicinal agents have been applied, which serves a double purpose, smoothing out the rugæ and so bringing the remedy to every part, and exerting a gentle pressure upon the mucous membrane, which relieves the congestion and thus favors conditions which are prejudicial to the growth of the bacteria. A few applications of the silver nitrate, followed by packing of the vagina, will usually cure the most obstinate cases of vaginitis.

We pass now to the cervix uteri, where the conditions are absolutely the reverse of those which were present in the vagina. We have a narrow canal with a small orifice, with a mucous membrane thrown into folds separated by deep depressions, non-dilatable except with the use of considerable force, and where every circumstance favors the continuance of the fertility of the specific germ. Fortunately, the external os seems to act as a barrier to the invasion of bacteria. The majority of cases of vaginitis of specific origin recover without any involvement of the cervix; but when such infection does occur, we have a difficult problem before us.

The simple conditions, which in the case of vulvitis and vaginitis seem to be adequate to secure a complete cure, here cannot be put in force. Rest and cleanliness cannot be secured in the same simple way as has already been described, so that it is necessary actively to combat the presence of the infecting agent, and owing to the anatomic conditions present in the mucous membrane of the cervix, this is particularly difficult to accomplish.

The evidence of infection is chiefly shown by the presence of the characteristic leucorrheal discharge from the os externum; this is largely in excess of the normal secretion, at first clear, quickly becoming opaque, later yellow or even green from the admixture of pus and epithelial elements. In a general way, it may be said that the deeper the color and the more tenacious the consistency, the more chronic the condition.

The object of treatment is, first, to destroy the source of infection and then to modify the action of the glandular structures so that the

secretion may become normal. The source of infection is the germs which, situated deep down in the crypts and depressions of the cervical canal, keep up their activity for an indefinite time, and how to reach these is the problem which confronts us. Simple applications of mild substances are inoperative, because they fail to reach the deeper-lying portions of the mucosa.

Every gynecologist, if he is honest, will confess that chronic endocervicitis is one of the most discouraging and obstinate affections which he has to treat. The non-operative treatment is practically confined to direct applications to the diseased area, and the more chronic the disease the more thorough and powerful must be the application. There are two difficulties in the way of making the application thorough; the first is the presence of the plug of mucus, which is characteristic of the disease, and which fills up the cervical canal deep down into the depressions and is dislodged with the greatest difficulty. The presence of this plug of mucus prevents the action of any agent from reaching the diseased glands; it must therefore be removed before such application is made, and the failure to do this is, I am confident, responsible for the poor success in the hands of many practitioners. Merely removing what is evident at the os externum by wiping it off with a cotton stick is not sufficient; there will always be a certain amount remaining in the cervical canal itself which will effectually nullify any medicinal application. This must be thoroughly removed, and the best way to accomplish it is by suction with a properly constructed syringe. A hard-rubber syringe with a short nozzle, to which is attached a piece of flexible rubber tubing, into the other end of which is inserted a glass nozzle, is the most satisfactory method I know of. If a little water is drawn into the syringe, the nozzle then inserted into the os externum, and firm suction made, the whole of the contents of the cervical canal can be aspirated. The water in the syringe serves to expel the mucus which is in the glass tube. It may be necessary to use the syringe three or four times before the cervix is sufficiently free from mucus to make the application a success.

The second difficulty is the fact that, as has already been referred to, the mucous membrane lining the cervix is thrown into deep folds. If the disease is of recent origin and there is not much hypertrophy of the glandular tissues, these depressions are not so deep but that a thorough application of some mild substance will be sufficient to

change the glandular action. The most popular and satisfactory in this latter type of affections is Churchill's tincture of iodine. This is best applied by winding an applicator with absorbent cotton, dipping it into the solution, and passing it into the cervix as far as the internal os. It should not be withdrawn immediately, but allowed to remain a minute or two,—which is of importance, because the effect of the iodine is to stimulate the contractile power of the cervix so that it grasps the applicator tightly, and the iodine is squeezed out of the cotton and penetrates all parts of the cervical canal. Such an application should be made two or three times a week to be effective.

For more obstinate cases, or those that have lasted longer, we may employ a mixture of equal parts of tincture of iodine and impure carbolic acid, called iodized phenol. Once in four or five days is often enough for this stronger application.

Unfortunately, the majority of the cases of chronic endocervicitis which we are called upon to treat are too chronic to respond satisfactorily to these milder measures. The most satisfactory treatment for the obstinate cases is the application of pure carbolic acid in the way I will describe.

The cervical canal should be dilated a little with graduated dilators, the plug of mucus thoroughly removed, and the cervix steadied with a tenaculum. Two applicators are then wound ready for use. The lower cul-de-sac should be filled with cotton soaked in alcohol. One of the applicators is dipped into carbolic acid, full strength, the other into absolute alcohol; the one with the carbolic acid is carried quickly into the canal, allowed to remain a moment, then withdrawn, and the second one with alcohol is immediately passed in, in order to neutralize the caustic effect of the carbolic acid, which renders it comparatively painless. Once a week is often enough for this heroic treatment.

If, in spite of these stronger applications, the disease remains active, they may be preceded by a slight curetting of the canal with the dull wire curette. This procedure does not require anesthesia, and may be done at the office. It will remove the hypertrophied layer of the glandular structures, and after the slight hemorrhage has been checked by packing with gauze the carbolic acid application may then be made with greater effect.

Non-operative surgery will, however, fail in a certain proportion of cases, and we are then obliged to resort to curetting under ether,

or excision of the diseased mucous membrane, measures which are definitely operative and, therefore, not to be considered here.

In speaking of the milder cases I forgot to mention the use of silver nitrate solutions, which will prove of value in these cases as well as in chronic vaginitis. Stronger solutions than have been referred to may be employed here, even up to 40 or 60 grains to the ounce (8 to 12 per cent.).

The os internum is another barrier to the invasion of infecting germs. Hence we find not a few cases in which the disease limits itself to the cervix and does not invade the body of the uterus. When that becomes diseased, we have practically the same conditions to deal with as in the cervical canal, with the additional difficulty that we are obliged to pass the internal os before treatment can be effective. We are therefore less able to accomplish what we would like by means of simple applications. The internal os is narrow, apt to be sensitive, and the introduction of an applicator through it, unless preceded by dilation, is not satisfactory, as whatever agent we employ on the applicator is apt to be pressed out of it in its passage through the internal os, so that very little will reach the endometrium. Non-operative treatment, therefore, presents greater difficulties and is followed by less satisfactory results than is the case when the affection is confined to the cervix. To be effectual the os internum must be slightly dilated, a procedure which is not always possible on account of the pain it causes; but when it can be done we employ the same methods as I have already described in the case of the cervical affection. Curetting, however, is much more frequently demanded in case of corporeal endometritis than of cervical.

The next step in the progress of inflammation of the genital tract is to the Fallopian tubes. If there are difficulties in treating the endometrium directly, they amount in the case of the tubes to an impossibility. The most that can be done is to exert an influence upon the general circulation of the pelvis from the vagina, and thus indirectly to influence the course of the inflammation in the tube itself.

The treatment of acute salpingitis is purely general; it consists of rest in bed, relief of pain by external applications, and the use of the hot vaginal douche. In the majority of cases resolution occurs from this method of treatment. If both ends of the tube

become occluded and pus collects in the tube itself, an operation is imperatively demanded for its relief.

What is known as chronic salpingitis shows itself in a variety of forms: it may be merely a chronic catarrh, the secretions from the mucous membrane finding an exit into the uterus and discharging freely; or there may be a stoppage of both the abdominal and uterine ends of the tube and the gradual accumulation of the results of the inflammation, forming what is known as a pus tube; or, again, the disease may manifest itself chiefly by a thickening of the tubal wall, the so-called interstitial salpingitis. In all these forms the symptoms are practically the same; they run a chronic course, are characterized by pain more or less severe in the affected side, and from the liability of an extension to the peritoneum are a constant menace to the patient.

While it may be said that in a majority of cases an operation for the removal of the affected tube is the most rational and satisfactory method of treatment, yet in many cases the severity of the symptoms does not seem to demand this, and patients are unwilling to undergo an operation for their relief. For this reason non-operative treatment by means of local measures is often the only course left to the surgeon. The relief that can be afforded, while not complete, is oftentimes very satisfactory. It is, perhaps, a fair statement to make that the condition present in all these cases is one of chronic congestion, and the line of treatment to be employed is directed to the relief of this congestion. That means depletion, and the most satisfactory method by which this can be secured is the use of the glycerin tampon.

There is, perhaps, in gynecology no one measure which is useful in so many conditions as the glycerin tampon. To be effective it should be so applied that it will cause the greatest amount of actual depletion of the pelvic vessels. The best substance to use for this purpose is prepared wool; it is elastic, will absorb and hold in its meshes a large quantity of glycerin, and is easily tolerated by the patient. A mass of this substance of perhaps the size of an egg (to which a string is attached), thoroughly permeated with glycerin, placed in the vault of the vagina will cause a profuse watery discharge, which will last for from 24 to 48 hours, and will require the use of several napkins. Such a tampon applied every other day or every third day will exert a marked effect upon the whole pelvic

circulation, will relieve pain, and will steady and support the uterus and render the patient very much more comfortable.

In the simple catarrhal form and the interstitial variety of salpingitis, this method of treatment, if persisted in for a few months, will oftentimes produce a marked improvement in the patient's condition. It can hardly be expected to have any curative effect upon a chronic pus tube, which can only be treated by operation.

As an addition to the tampon the use of iodine is of value. In my own practice I usually paint the vault of the vagina with iodine before the application of the tampon. If, as is sometimes the case, there is too much sensitiveness to admit of the use of the tampon at once, a few applications of iodine will often so diminish the sensitiveness that the use of the tampon may be begun.

Ichthyol has a marked analgesic effect in certain cases. After soaking the tampon with pure glycerin, a little of a mixture of ichthyol (1 part) and glycerin (12 parts) may be added with this idea in view.

Occasionally the size of the tampon is an objection to its use. In such cases a small pledget of cotton treated with the ichthyol and glycerin mixture only may be employed. Beyond these simple measures there is very little that can be done locally for chronic salpingitis.

To complete the subject of inflammations of the pelvic organs it is necessary to speak briefly of the non-operative treatment of local peritonitis. The acute form can be treated as I have pointed out in the case of acute salpingitis. Chronic peritonitis may also be to some extent limited in its course by the simple measures that I have already outlined as applicable to chronic salpingitis,—namely, iodine, ichthyol, and the glycerin tampon.

The results to be feared in local peritonitis are the formation of adhesions, the dislocation and fixation of the pelvic organs, and the interference with the pelvic circulation. Just as soon as the patient can be treated locally, after an attack of acute peritonitis, these measures should be instituted with the idea of preventing as far as possible the formation of adhesions and their becoming firmly organized. This is to a certain extent prophylactic. When the damage has been done and the organs are firmly fixed in an abnormal position,—uterus, tubes, and ovaries bound together in an indistinguishable mass and more or less immovably fixed,—considerable improve-

ment may be effected by the use of firm packing of the vagina with cotton pads soaked in glycerin and gentle and intelligent massage at more or less frequent intervals. In this way adhesions may be stretched and possibly broken up, the products of inflammation absorbed, pelvic circulation improved, and both the local condition and the general state of the patient markedly improved.

In treating the subject as I have in this paper, I have said nothing about the value of general measures for keeping up the patient's health. These are too important to be overlooked, and I think it hardly necessary to do more than to call the attention of the physician to their necessity. The general lines upon which these should be carried out are familiar to all. It is, of course, important to maintain the general health by good food, rest, suitable forms of exercise, the avoidance of over-fatigue, both mental and physical, extreme care just before and during menstruation (a time when there is a great tendency to congestion and a lighting up of fresh inflammation), the avoidance of exposure to cold and dampness, and such other special precautions as the individual patient requires.

Many of these cases of chronic inflammation of the tubes and the peritoneum which at first glance seem hopeless of relief except by operative interference may be practically cured by the milder measures which I have indicated. I have seen a not inconsiderable number of cases in which the removal of tubes and ovaries has been advised by good gynecologists, in young women, many of them not married, who by following out these local and general forms of treatment have been so far cured that they have married and had children. It requires patience on the part of both the surgeon and the patient herself, but the result amply justifies this course.

THE NON-OPERATIVE TREATMENT OF CHRONIC OVARIAN LESIONS

BY DANIEL H. CRAIG, M.D.

Surgeon to Out-Patients, Free Hospital for Women, Boston; Instructor in
Clinical Gynecology, Tufts College Medical School; Instructor in
the Boston Polyclinic, etc.

THE operative treatment of ovarian and tubal lesions has reached such a high state of advancement; in competent hands it is so comparatively safe and is undertaken by so many men in even the smaller rural communities; and the literature of the subject has become so abundant, that the suggestion which prompts this contribution is regarded as timely. Indeed, opinions recently given at least verbal expression, seem to indicate a strong need of work in restraining those who from over-enthusiasm or other motives are carrying into error those who look to them for guidance. A teacher in one of our representative medical colleges recently expressed, unofficially, his opinion that the day of gynecology as a specialty has passed. This opinion is the result of a dual cause: an over-enthusiasm for abdominal surgery, and a neglect of careful painstaking and patient non-operative treatment. The over-enthusiasm of a few, or even of many, does not constitute a valid contraindication to intelligent, ambulatory, non-operative gynecology in carefully selected cases. So long as there shall be surgeons or specialists who know more about the female pelvic and urinary organs than do the body politic of the medical profession, so long will gynecology as a specialty persist, be recognized, and be needed. The urinary organs are included in the above statement because they are anatomically as peculiar to the two sexes as are the generative organs.

And that these views may not seem over-enthusiastic, it should be understood that careful diagnostic selection is an essential to success. The non-operative and the operative methods should not be considered as competitors but as co-operative partners. Many cases are manifestly unsuited for non-operative treatment, many others prove untractable, some which appear hopeless are so greatly bene-

fitted that much less is finally demanded of the operation and many apparently hopeless cases recover,—at least functionally and symptomatically. One ovary or ovary and tube or tubes may often thus be saved in cases in which bilateral extirpation seems imperative on first examination. It is, therefore, well to attempt relief by this method in all cases before consigning the patient to operation, for even though the result be a disappointment, the pelvic condition will in the majority of cases have been ameliorated and the operation made easier for both patient and surgeon.

Much better judgment and much greater moral courage is required to undertake the non-operative than the operative treatment, for the impatience of the patient is a constant factor. In chronic non-suppurating ovarian and tubal lesions operation is as little dangerous as perhaps any form of abdominal or pelvic surgery, and in competent hands is usually followed by ultimate good results. The word ultimate is used advisedly, for while occasionally very dramatic results occur, thus proving good selection of cases, on the other hand it not infrequently happens that the patient has to sacrifice quite as much of her time to a protracted convalescence as would be consumed in non-operative treatment, with the difference that in the first instance she has been obliged to yield up her pelvic organs and in the other she still retains them. And just here seems a fitting opportunity to say a word as to the sentimental nonsense of which so much is heard about unsexing women and the mythical supposititious effects of the removal of diseased ovaries. Nothing can justify the removal of healthy functioning ovaries, but, on the other hand, neither can anything justify the leaving behind, on sentimental grounds, ovarian tissue which by its presence for any reason constitutes a menace to the woman's health. If they are so diseased as to require removal nature, as far as their physiologic functions are concerned, has already removed them, and in taking them away she is merely relieved of several retrograde processes. Careful observation has shown that convalescence from pelvic surgery is in exactly inverse ratio to the time spent in intelligent preparation; not in frequently irrational and irrelevant imaginary "building up the blood," but in the amelioration of actually existing lesions.

That any advice may be given or any treatment instituted presupposes an exact diagnosis, and this is always difficult and not infrequently impossible. Every surgeon who frequently opens the abdom-

inal and pelvic cavities after his most careful diagnostic investigations finds that what has been considered a prolapsed, cystic ovary is in reality a collection of fluid in the ampulla of the tube which has gravitated into Douglas's fossa, thus hindering the palpation of the perhaps small, normally situated, ovary.

It should be an invariable rule never to make a final diagnosis and, more important still, prognosis in chronic ovarian and tubal lesions until such a case shall have been repeatedly examined, either personally or by a confrère in whose judgment there is confidence, at intervals of several days. For example, it is not uncommon for patients to be referred to hospital clinics for advice or operation in whom ovarian disease is said to exist alone or in conjunction with other lesions. Examination fails to reveal the lesion, and inquiry proves that the referring physician examined the patient but once. The case is then clear. At the time of that one examination the ovary was enlarged and sensitive from the presence within it of a false corpus luteum from a recent ovulation. Repeated examinations would have shown the disappearance, or at least rapid subsidence, of such tumefaction.

Then, too, there is still another cause of over-estimation of the seriousness of adnexal lesions. Patients appear with ovarian and tubal prolapse shortly after the cessation of the catamenia, during which they have been afflicted with "cold" and cough. Repeated efforts fail of replacement of the exquisitely tender adnexæ, and a diagnosis of prolapsed and firmly adherent ovary is made. Relieving the cough, however, permits a subsidence of the pelvic congestion, which is aided by local depletion, the bowel is emptied by saline cathartics, and if necessary by high enemas of magnesium sulphate, glycerin, turpentine, and suds, and the patient is told repeatedly to assume the genu-pectoral posture. Three days later the ovary may be found either in its normal position or easily replacable. The rationale is simple. The ovary was heavy with catamenial congestion; it contained a false corpus luteum; cough had increased the catamenial congestion of all the pelvic structures and had displaced the ovary downward. The pelvic crowding due to congestion, aided by the downward pressure of a loaded sigmoid, which latter condition so frequently follows the administration of opium-laden cough mixtures, had rendered replacement so difficult as not to be borne by the patient. The possibilities of variation of the above illustra-

tions are wellnigh infinite. Two other sources of error seem too important to be omitted. The normal mature Graafian follicle is from 0.5 cm. to 2.0 cm. in diameter, and there are in normal ovaries usually 18 or 20 of these more or less fully developed follicles of various sizes. It is probable that many an ovary containing several superficial nearly mature follicles has been called "cystic" and removed; and it is also probable that many a scalpel has been thrust into such a follicle and thus a so-called "cyst" evacuated. Another error is that of mistaking a marked passive congestion of the pampiniform plexus for organic disease and tumefaction of the adnexæ or broad ligament.

The best insurance against diagnostic and prognostic error is through investigation. The first step should invariably be the procuring of the fullest possible history of the case, in which much assistance is often gained from letters from the referring physician. The second step is a complete physical examination which begins at the head and ends at the feet. Dudley says careful all-around examination may show some causal and removable extrapelvic fault. The bladder must invariably be emptied immediately before such examination, as a full bladder not only impedes palpation but renders it much more painful, causing the patient to contract firmly the pelvic muscles and thus render the forcing upward of the perineum difficult or impossible. This contraction is involuntary and irresistible, arising from the imperative need of retaining the contents of a full bladder which the palpating finger incites to expulsive contraction. Patients will seldom admit this desire, and are often accused of a "nervous" inability to "relax" when in reality the inability is due to the fear of a mortifying emptying of the bladder.

Owing to the relationship existing between respiratory and pelvic diseases the throat should be examined for catarrhal conditions which might give rise to cough. All the thoracic and abdominal viscera should be carefully examined. Special attention should be given to the kidneys, as to their mobility and palpability, to the liver and gall-bladder, and, perhaps most important of all, to the colon. An impacted sigmoid remaining unrelieved will more than counterbalance the most energetic local treatment. A strict compliance with the above rule of a complete physical examination will be found to restrict "reflex" symptoms within comparatively narrow limits.

The pelvic organs are next investigated by external inspection, by vaginal and bimanual palpation, and by internal inspection through the Sims speculum if the necessary assistance is available. Should examination reveal concomitant or complicating extrapelvic lesions, their rational treatment is a prime essential to success. The treatment should be carried on as though no pelvic treatment were being instituted. Neither alone will replace the other, but a judicious combination of rational treatment of extrapelvic conditions, careful general hygienic regulation of the patient's environment, and persistent pelvic treatment will often yield most gratifying results.

The treatment to be outlined below is that personally employed in my private practice and at my clinic at the Free Hospital for Women. This is particularly specified because no general rules for treatment are officially promulgated, and the treatment of other surgeons to out-patients probably differs, perhaps widely.

Reposition of all replacable organs is the first step. No matter what condition, other than acute infectious or suppurative diseases, is found in the tubes and ovaries the initial treatment is invariably the same. The sole object is local depletion and reduction of passive congestion. The cervix and vaginal vault are cleansed with a saturated solution of sodium bicarbonate (which quickly dissolves the mucous secretions) and then thoroughly painted with Churchill's tincture of iodine. Iodine for a number of years suffered an entirely undeserved eclipse in the light of the too numerous chemical preparations which have been literally showered upon the profession during the past 10 years. But after a generous trial of many of them iodine remains by far the most reliable of all. Only recently the remark was heard that painting with iodine "had gone out of fashion," but if such is the fact, like all other fashions, it will speedily return. A strip of gauze one yard long and four inches wide, provided with a silk thread at one end by which the patient may withdraw it (Fig. 1), is saturated with glycerin throughout two-thirds of its length and packed snugly about the cervix in the vaginal vault. This strip, the suggestion of which was obtained from an article by Dr. Goelet, far surpasses in therapeutic value the more commonly employed glycerin tampon. The iodine, acting as a counterirritant, determines blood to the vaginal vault, and the glycerin, through its powerful hygroscopic property, extracts the watery elements, thus

producing a profuse watery vaginal discharge and reducing congestion. The patient is instructed to remove the strip as soon as the watery discharge has ceased. Those wearing silk skirts should be provided with a serviette, as the discharge is often quite sufficient completely to ruin unwashable material if the patient has any considerable distance to travel in returning home.

On removing the dressing, a six-quart douche, as hot as can be borne, is to be taken in the recumbent posture, and repeated twice daily until her next visit. During this interval the bowels must receive any necessary attention. If necessary, this treatment is repeated at intervals of two or three days until all possible congestion has been removed; but one such is often quite sufficient. The patient is now ready for the real, aggressive treatment to begin.

In 1879, Mundé suggested the treatment of these conditions by systematic tamponade of the vagina with absorbent cotton wrung out in glycerin and water. He directed that the vagina be packed full, but that the packing be stopped before reaching the vulva, although not specifying just where to stop, and further suggested that the retention of the packing be aided by a T-bandage. He expressed full confidence in the ability of this non-operative treatment to restore many patients to health, even though numerous adhesions existed. At that time Talliaferro and Bozemann were each claiming priority in suggesting this line of treatment, Bozemann stating in discussion that he had been using this treatment then for 20 years with good results. The following treatment is, then, not in the least original, except as to details, but is the direct result of evolution.

Once more, the principles underlying the treatment are the same in all cases from the simplest to the most complicated. Any benefit to be derived must come from the combined action of two, or in some cases three, factors. They are pressure, massage, and, in some cases, medicinal alleviation. These three results may all be achieved by one method.

As the dressing about to be installed must be worn at first continuously, every effort must be made to remove all secretions from the cervix and vagina. This the sodium bicarbonate solution readily does.

Once clean, the vaginal vault is painted with iodine, or not, according to the presence or absence of deep-seated congestion, and sys-

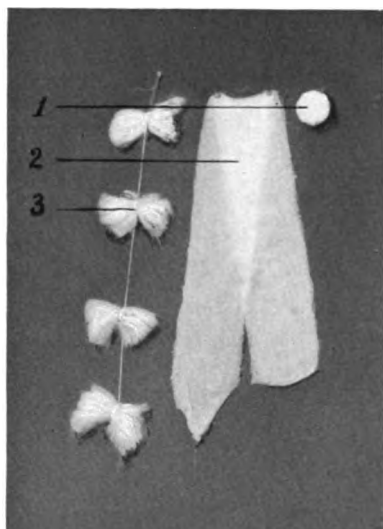


FIG. 1.—Dressings used in the non-operative treatment of chronic ovarian diseases.
1. Cotton-ball. 2. Gauze strip. 3. Kite-tail dressing.

tematically packed with lamb's wool or *non*-absorbent cotton. Absorbent cotton or other material which loses its elasticity and shrinks in volume on becoming saturated with the vaginal secretions should not be used. The wool is split into strands about an inch in diameter, and the rope thus made is cut into lengths of about three inches and knotted at intervals of about six inches on strong embroidery silk, thus constituting what is known as the "kite-tail" dressing (Fig. 1). While all dressing material should be kept scrupulously clean and protected from dust and soil, it is entirely unnecessary to have sterile dressings for this ambulatory treatment.

This dressing, when properly installed, is capable without medication of fulfilling two of the above indications, namely, pressure and massage; pressure by its elasticity, and massage by forming an elastic mass analogous to the vaginal finger of the pelvic masseuse. The analogue of the external manipulation of the masseuse is supplied by every muscular motion of the body, by every step, and even in sleep by the rythmical pelvic movements resulting from respiration. This is a most excellent massage and is free from the disadvantages of manual massage. It is gentle, continuous, painless, cannot arouse erotic sensations, and cannot do mischief by over-enthusiasm. If it seems desirable to add the third factor, alleviation of pain, this can readily be accomplished by medicating the first two tampons with ichthyol, glycerin, and water, equal parts. When ichthyol is not used the vagina should be generously powdered with dry boric acid from a powder-blower, thus effectually preventing decomposition of the vaginal secretions with the resultant vaginal and vulvar irritation and disagreeable odor. If thus carefully antisepticized, such a dressing may be worn a week. Packings which are installed with the intention of being worn for several days should never carry more than 33 per cent. of glycerin, as the hygroscopic action of this latter induces the quick saturation of the dressing and favors maceration of the superficial vaginal epithelium.

Next in importance to the correct choice of materials is the method of their installation. The degree of firmness and compactness necessary to control hemorrhage is to be particularly avoided, as it destroys the elasticity of the wool. Moreover, a dressing which seems loose and insufficient with the patient in the knee-chest or

Sims's position immediately becomes more firm on the resumption of the upright posture.

The correct position of all the pelvic viscera is important, and if it cannot be secured *in toto* it should be achieved as far as possible. Since carrying the cervix uteri backward into the posterior vaginal fornix must inevitably throw the non-adherent fundus forward, it is imperative that the posterior fornix be *not* occupied by a tampon, since two bodies may not occupy the same space at the same time. The cervix is, therefore, carried backward and the first and second tampons are packed snugly into the left and right lateral fornices respectively. These being in place, the remainder of the upper portion of the vagina is snugly filled with tampons down to the bulbocavernous muscles on each side. The location and recognition of these muscles is of the utmost importance, as upon this depends the entire success of this method of treatment. This muscle, also called the sphincter vaginae, is placed on each side of the orifice of the vagina, and is analogous to the accelerator urinæ in the male. It is attached posteriorly to the central tendon of the perineum, where it blends with the sphincter ani. Its fibers pass forward on each side of the vagina to be inserted into the corpora cavernosa of the clitoris, a fasciculus crossing over the body of the organ so as to compress the dorsal vein. But, more easily than by the above description from Gray, the muscle may be recognized by the finger. On carrying the tip of the finger into the vagina on its lateral aspect the finger readily detects the round muscle just within the vulvar orifice, and on passing beyond it appreciates a distinct pouching of the vagina. If doubt is experienced, the patient on being requested to "draw in" the muscles will readily tighten them.

Having discovered the muscles and filled the vagina down to them, a tampon is forced out laterally behind the right muscle and held there by a cotton-stick. The patient being in the knee-chest or, as is usually preferable, the Sims position (it will later be shown how this latter position may be used for this packing without an assistant), a "bridge" of tampons is built across the vagina from the right to the left muscle, each tampon being firmly held against its predecessor until the last disappears behind the left muscle. The dressing is now complete, and while the "bridge" is steadied by the dressing forceps or cotton-stick, the speculum is carefully

withdrawn. From the last tampon a thread is left dependent by which the dressing may be withdrawn by the patient.

If the foregoing *modus operandi* is carefully followed the operator will be impressed with the comparative smallness of the dressing, seven to ten tampons of soft wool usually being quite sufficient, and as the vulva closes behind the withdrawn speculum it is plainly evident that the vagina is filled. This "bridge" construction is important. Long experience with it has demonstrated the fact that a patient should no more feel a properly installed packing than she should a properly fitted pessary. Pain that is more than a temporary discomfort is an absolute indication for the withdrawal of either the packing or pessary. By adherence to this "bridge" construction three essential points are gained: (1) Firm support; (2) freedom of the urethra from pressure, and (3) freedom of the perineum from pressure. The firm support is derived from the bulbo-cavernosus muscles, which, upon the withdrawal of the speculum, by their contraction approach each other until, lying side by side, they completely close the vaginal orifice in a manner exactly analogous to that in which the laryngeal orifice is closed by the approximation of the vocal cords. Pressure upon the urethra induces either a stinging urethral tenesmus or an obstruction, neither of which will cease until the packing is removed. Pressure on the perineum from the vaginal side will cause the same apparent desire for defecation which is caused by the pressure of accumulated fecal matter on the rectal side. This leads the patient to resort to the closet and strain until she succeeds in forcing out one or two of the lower tampons, thus not only rendering the packing useless but through the respiratory efforts incidental to straining greatly augmenting the already existent pelvic congestion. A further reason for the stopping of this packing above these muscles is the fact that any substance between them will hinder their normal physiologic closure of the vaginal orifice and they will continually strive to perform their function, thus repeatedly compressing the dorsal vein of the clitoris with the resultant erection of that organ and the causing of very annoying sensations.

During the first week or two of treatment this packing should be worn continuously, it being each time, at intervals of three or four days, worn back to the doctor's office, where it is removed and after thorough cleansing of the vagina a new packing is installed.

VOL. I. Ser. 14—11

After a perceptible improvement has been accomplished the patient may be allowed to remove the dressing herself upon the morning of the day appointed for her next visit and take a copious (four to six quarts) hot douche. After still more improvement it may be removed the night before, and thus the intervals of freedom from the dressing are gradually increased according to progress.

A strict adherence to the above rule will work good in two ways: (1) Through the actual work performed by the dressing, and (2) by necessarily temporarily interdicting sexual relations,—which latter is often an essential to success in these conditions. If the patient returns with the dressing removed contrary to instructions and claims that "it came out," a very quiet and dignified suggestion that it is often taken out for intercourse will practically invariably result in its remaining properly in place the next time. If, however, it is still removed, the thread usually left dependent may be cut short within the vagina, when it becomes very difficult for the patient to remove the dressing. This should, however, never be done with the first or second dressing, as the tolerance of the patient for this form of dressing is an unknown quantity, and it would be unjustifiable to remove from her the possibility of immediately removing a painful dressing. For obvious reasons of domestic economy intercourse should not be thus interdicted beyond absolute necessity.

The bivalve speculum may be used in conjunction with the Sims position for this particular form of treatment with very good results, although in so doing extra care is necessary to be certain that the portions of the vaginal walls necessarily hidden by the blades are thoroughly cleansed. This speculum is available in this class of cases because the lateral separation of the blades allows the free lateral placing of the first two tampons and the construction of the bridge (Fig. 2).

Progress will necessarily be slow, and the patient should be so informed at the outset, it being far wiser to promise little and accomplish much than to reverse the order and simulate the tactics of charlatans. Indeed, it is always advisable to inform patients frankly from the first that the effort may fail of a cure, but that if it does it will certainly render any subsequent operation less serious in extent and will shorten the convalescence.

Subjectively, progress is characterized by three distinct eras. In the first she will realize a sense of pelvic pressure or "fulness,"

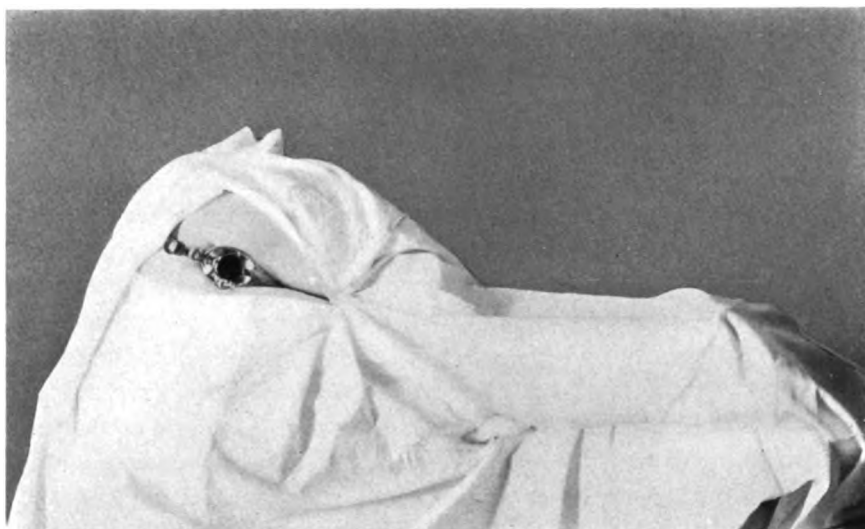


FIG. 2.—Showing the use of the bivalve speculum with the patient in the Sims position. The labia are perfectly separated and the lateral walls of the vagina are not covered by blades.

but there should be no actual pain. As above stated, pain should be invariably considered an absolute indication for the removal of the dressing, and if several, consecutive, carefully installed packings invariably cause pain, this constitutes the most potent of all contraindications to non-operative treatment and the most potent argument in favor of resorting to operation. This sensation of fulness is usually felt only after the first two or three treatments and may fail of appearance at all, the patient entering at once upon what usually constitutes the second stage, in which she feels buoyed up and supported during the wearing of the dressing and misses it greatly after its removal. The third stage is for the patient at once the most satisfactory and most dangerous. For in this stage she feels well both with and without the dressing. The danger lies in the fact that she will assume that her physical improvement has kept pace with the subjective relief and will, therefore, become negligent in treatment or omit it altogether, thus assuring a relapse after a few weeks or at most a few months. It is, therefore, necessary, or at least wise, to forewarn her of these progressive stages, thus doing much to secure her persistence in treatment.

During this treatment occasional efforts at replacement of organs not at the outset replaceable will incidentally keep the doctor informed as to the progress in securing the relaxation of adhesions. Adhesions which at first seem strong may be made in favorable cases to disappear entirely. Their vitality is low at best and their blood-supply meager. Stretching them reduces the caliber of their tiny blood-vessels until circulation is finally cut off, the fibrous elements are starved, undergo atrophy, and disappear. Bimanual examinations should not be made too frequently unless called for by special indications. Too frequent examination not only retards progress but also hinders good judgment. Growth is not appreciated in the constantly observed child, but absence, even for a short time, makes growth readily realized upon return.

If menstruation, during which all treatment is suspended, fails completely to relieve the menstrual congestion, it is wise to use a glycerin strip for depletion for 24 hours before reinaugurating the regular dressings. Should the vagina appear irritated or excoriated by pressure, the treatments can be alternated as above, often with perfectly satisfactory results. Occasionally cases will be met in

which the vagina so resents the pressure and becomes so easily excoriated that the treatment has to be abandoned.

Noble states that if careful, systematic, and judicious treatment has been persisted in for a period of one or more years without achieving a cure, it should be abandoned. This statement is too arbitrary, and if adhered to would entail an enormous unnecessary loss of time in many cases. Progress rather than time should constitute the criterion. When the patient has ceased to gain both subjectively and objectively and the treatment has been persisted in until in the individual case certainty is felt that the cessation is permanent and final, the time has arrived to stop this form of treatment and resort to more radical measures, unless the disease is so far relieved as to render further treatment unnecessary. If not cured, or at least completely relieved both subjectively and functionally, the patient should be operated upon at once, as it is thus that the greatest good may accrue from the previous treatment.

Cases which are unsuitable for this treatment will manifest the fact from the outset, either by increased pain or absolute failure to improve, so that comparatively little time need be lost in unsuitable cases. Unquestionably he who employs both the operative and the non-operative methods is best qualified properly to select cases for each method, because he has the opportunity, by opening the abdomen, of learning just why the non-operative treatment failed. And the reasons vary just as much as the individuality of the patients vary.

It has been feared that prolonged and repeated packing of the vagina would lead to its relaxation, but such is contrary to the fact. Acting as it does by automatic pelvic massage, such packing, through its stimulation of the pelvic circulation, does away with passive congestion, favors muscular tone, and therefore invariably restores the vaginal walls to their normal tone, and it is necessary continually to reduce the size of the dressing. Relaxation and stretching are caused only by inelastic structures, such as rings of large diameter, large pessaries, and packings of absorbent material, which soon become sodden and lose all resiliency.

The greatest superiority possessed by this method lies in the fact of its conservation, if successful, of the functions of the various organs involved. But since the organs are not removed, it is no small part of the doctor's duty to advise his patient carefully to

avoid all the etiologic factors of these conditions, thus insuring a freedom from recurrence.

It has been asked, How shall single women and young girls be treated? If actual physical, objective lesions exist beyond mere congestion or the results of anemia, chlorosis, or other extrapelvic causes, no internal medication will be of the slightest benefit, and the physician must use his best judgment in aiding the parents or the patient herself in deciding upon operative or non-operative treatment. Non-operative treatment should be resorted to in young girls only in the milder cases in which adhesions are lax, slight, or absent; in other words, when the chances of speedy recovery by this means seem most highly probable.

For the rest, it seems best to indorse the opinion expressed by Dr. Graham at the fifty-fourth annual session of the American Medical Association, at New Orleans, where she said, in discussion, "Whenever you find disease, you have reached the age to treat it." If one might judge by the applause which greeted this expression the opinion was shared by many, as the subject under discussion was gynecologic conditions in young girls. It is best, however, always to avoid every gynecologic manipulation of immature and single girls so long as by so doing their present and future welfare is not jeopardized. All such diagnostic manipulations should be conducted under anesthesia, nitrous oxid being particularly useful in office work. Any serious condition thus detected should be remedied by operation, if so doing does not entail the sacrifice of organs capable of future function, and does not carry a too grave prognosis in the individual case. Certainly, no "local" treatment is justifiable in young girls if reasonable doubt of its ultimate success exists.

Neurology

PERIPHERAL NEURITIS

A CLINICAL LECTURE DELIVERED AT THE NEW YORK POLYCLINIC

BY WILLIAM BROADDUS PRITCHARD, M.D.

Adjunct Professor of Mental and Nervous Diseases in the New York Polyclinic
and School for Graduates in Medicine; Consulting Neurologist
to the Smith Infirmary, New York City

PRESSURE NEURITIS

GENTLEMEN: Through the efforts of Dr. McPhee, my chief of staff, I am enabled to show you to-day quite an interesting variety of clinical sub-types of the same generic nervous affection. All of the patients before you, six in number, are the victims of peripheral neuritis; each case differs from the others, however, in the location and in the etiology, as well as in other interesting and important facts.

CASE I.—The first patient, this colored man, has perhaps the simplest and least important variety, a "pressure neuritis," or pressure paralysis, as it is sometimes called. "Barkeepers' palsy" is another name by which it is sometimes described,—so-called from the frequency with which it is found in men with this occupation. Worn with long hours and with a diminished resistance and an active predisposition from alcoholism, the habit common to these men of sleeping while standing, the head resting on the arms folded on a cold marble or hard mahogany bar, affords the etiological explanation for the popular term of description. This negro, after an evening of alcoholic excess, three days ago, went to sleep with his head resting upon his arms, which were in turn folded upon the back of a chair. He slept heavily, probably in a drunken stupor, for several hours. When he awoke the right hand and forearm "felt dead." He could not use them in any way requiring force or

power. Subjectively there was no pain, nor has he suffered any pain since, but numerous and varied sensations, known collectively as paresthesias, have annoyed him more or less continually, chiefly numbness and tingling, as though the hand were "asleep." I call your attention to the drop wrist, due to paralysis of the extensors, and to the diminished hand grasp. There is no atrophy, no trophic changes in the skin, no variation from the normal, as yet, in the electrical response. The symptoms in such cases are usually referable to the ulnar and musculospiral nerves. The prognosis is excellent, both as to promptness and completeness of recovery.

Treatment.—Interrupted galvanism, eight to ten milliamperes daily, for 10 to 20 minutes, with massage and strychnin, in doses of $\frac{1}{25}$ grain (0.0025 gram) every four hours, will effect a cure in from one to four weeks. In rare instances these cases, especially if neglected at first, are obstinate and protracted. Especially is this true of that variety of pressure or traumatic paralysis known as crutch palsy.

FACIAL PARALYSIS

CASE II.—The second patient has a very common and quite an important variety of peripheral neuritis, affecting the seventh or facial nerve, and known as facial palsy, rheumatic facial paralysis, Bell's palsy, and car-window paralysis. The last term is especially significant as to a frequent etiologic factor, exposure to direct cold. The nerve is quite superficial anatomically and but poorly protected from either trauma or cold. The importance of this form of neuritis is esthetic or cosmetic and somewhat a matter of sex, rather than vital. In patients who do not recover, the facial deformity from atrophy and asymmetry is almost tragic if the patient be a woman. With face twisted awry, drooping mouth angle, staring lagophthalmos, and wasted muscles, the feminine victim of this form of neuritis, if it prove vicious, is a martyr indeed, and not very charitable either in her opinion of the doctor who treated her, especially if she finds that he has been incompetent or negligent.

The most important consideration in facial palsy is the question as to whether the affection is central or peripheral. If central, the case is infinitely more serious. Fortunately, a mistake here is rarely made and is practically never excusable. In the central (brain) cases the upper branch is rarely affected. It is very uncommon for a cerebral lesion to pick out the facial center alone, sparing all

others. If central and of the right face, there is almost necessarily aphasia in some degree and usually, even in lesions, quite limited, of the cortex or subjacent white fibers, there is associated implication of the arm of the same side or a hemiplegia. Lagophthalmos is rare in the central cases, and so also is atrophy, though this latter fact is of less immediate importance, as it does not occur in any case until after a varying interval and the differential diagnosis must be made at once. The mode of onset is quite different, the central cases developing with apoplectiform symptoms, or at least with some general manifestations of cerebral disturbance. In the peripheral cases the patient, quite often, first discovers the paralysis on looking into a mirror, or from an unexpected dribbling of fluids in attempting to drink, or from an inability to whistle. There is rarely, if ever, any sensory disturbance, unless the fifth nerve be simultaneously affected. This associated paralysis of the fifth and seventh nerves is comparatively rare, although I have seen perhaps half a dozen examples. It is quite often due to syphilis, which is not true of Bell's palsy, and is easily recognized by the additional symptoms of hyperalgesia followed by analgesia, and by active and early trophic symptoms, particularly neurotrophic ophthalmia. It is sometimes of importance to determine at what point the lesion in Bell's palsy exists, and there are various signs, dependent upon the implications of certain branches, by which the anatomic extent of the disease can be determined. The prognosis, and to some extent the conjectural etiology, is dependent upon such determination. Practically it is sufficient to say in this connection, as regards prognosis, that if the analysis of symptoms points to a lesion outside of the stylomastoid foramen, the prognosis is much better than if the lesion is within.

Returning to the patient, I quote the following history: A. B., aged 36 years, a female, a housewife, is thin and anemic. The family and personal history is negative. Three weeks ago she took an afternoon nap, exposed to the draught of an open window. On awaking she noticed a peculiar sensation of stiffness and awkwardness on the left side of her face, and looking in the mirror found her face twisted awry, the left angle of the mouth drooping, with inability to control the left eyelid. Three days later she reported at this clinic, and the following facts were noted: motor paralysis on the left side of face, involving all the branches; no action of the

corrugator supercilii of the left side; droop at the angle of the mouth; some impairment of sensation on the left side of the tongue (chorda tympani); hyperacusis of the left ear; no action of the muscles of the left palatine arch on forced vocal expiration requiring patient to say "Ah!" no disturbance of skin sensation of the extrinsic muscles of the eye, or of the pupillary reactions; and no implication of arm of the same side.

A diagnosis of Bell's palsy was made and the lesion referred to within the stylomastoid foramen, probably near the geniculate.

The prognosis in these cases is generally good, recovery ensuing after 3 to 6 months' active treatment. Considerable progress toward recovery has already been made in this case, and she will ultimately and in all probability within the time limit already designated make a good recovery under the following plan of treatment.

Treatment.—The face is massaged daily with inunctions of lanolin; the patient takes three doses daily of strychnin sulphate, $\frac{1}{25}$ grain (0.0025 gram), with quinin sulphate, 1 grain (0.06 gram), and iron carbonate, 3 grains (0.2 gram); and three times a week she is treated with electricity in the form of galvanism. An Erb neck electrode, 2 x 4 inches, is applied back of the neck and to her left face an adjustable (pliable, flexible) Erb electrode, 2 x 4 inches, is applied. Five to seven milliamperes of electricity are introduced by means of the rheostat and the séance lasts from 10 to 25 minutes. On alternate days the interrupted current is applied. Daily applications would hasten the result in obstinate cases. Faradism, with a current of high tension, on alternate days, would prove advantageous, especially in preventing atrophy. The empirical use of potassium iodid is sometimes apparently of benefit in doses of 5 to 10 grains (0.3 to 0.6 gram), well diluted. It would seem almost an insult to your intelligence to remind you that in cases in which an obvious etiology in some bone or dental or aural disease exists, removal of the exciting cause is always a preliminary necessity.

INFLUENZAL SCIATIC NEURITIS

CASE III.—The third patient gives the following history: In March, 1903, he had an attack of catarrhal influenza, with severe throat and bronchial implication. Immediately upon the subsidence of the febrile symptoms the patient noted an aching pain in the right leg, along the course of the sciatic nerve. The effect of a

climatic change from a trip South on convalescence was beneficial in every respect, except that of pain and disability in the functions of the right sciatic nerve. The right leg became easily and quickly tired from any exertion and a variety of abnormal sensations, numbness, tingling, pins and needles, and other paresthesias developed, in addition to the constant aching pain. At home, at the theater, in church, anywhere, where the patient was constrained, he felt this pain and these paresthesias. When first examined by me in May, he presented the following symptoms: Pain intensified by pressure along the course of the sciatic nerve of the right leg, especially at the popliteal space and at the outer aspect of the ankle; slightly diminished power and some anesthesia in the area of cutaneous distribution; beginning atrophy as indicated by contrast measurements of the two legs, which showed: right leg at middle of the thigh, $17\frac{1}{2}$ inches; left, $18\frac{1}{2}$ inches; right calf, $15\frac{1}{4}$ inches; left, $15\frac{3}{4}$ inches; right ankle, $7\frac{1}{8}$ inches; left, $7\frac{3}{8}$ inches. Bearing in mind the normal reversal of these measurements and findings, the continuous pain in a certain area, the paresthesia and the other subjective symptoms, as well as the etiologic factors present, there was no hesitation in reaching the diagnosis of sciatic neuritis from infection. I immediately put the patient upon the following plan of treatment.

Treatment.—Functional rest as far as possible; the internal administration of quinin sulphate, 1 grain (0.06 gram), strychnin sulphate, $\frac{1}{40}$ grain (0.0015 gram), and arsenous acid, $\frac{1}{50}$ grain (0.0012 gram), three times daily; and electricity in the form of galvanism, 5 to 10 milliamperes daily through the largest sized Erb electrodes, one under the right foot and the other under the buttocks, the patient sitting on the well-protected electrodes. The patient in addition was given massage daily, very gently at first, all so-called Swedish movements being avoided. In applying electricity, special importance was attached (1) to a position of comfort and freedom from restraint during the séance, and (2) upon a diffusion of the current by means of large electrodes thickly padded. The current should always be introduced and withdrawn carefully, though the rheostat and the meter, rather than sensation, should be the guide as to quantity. This patient is quite well advanced toward recovery, being practically well, though still able to distinguish by occasional aching and fatigue the right leg from the left.

Such good results are by no means the rule. Sciatica is often most intractable and will at times tax your resources and your patience to the limit. Much more radical measures are often necessary. The patient must be put to bed, and even more stringent measures adopted to procure total physiologic and functional inaction of the nerve. The long hip splint may be advisable. When applied, it should be so adjusted as to permit of the application of hot or cold water bags along the course of the nerve or of the application of the actual cautery, which is extremely efficacious at times, especially if used early. With the patient in bed, the limb in a splint, and a chain of ice or hot water bags as a cushion for the leg, the acute suffering may sometimes be controlled without anodynes. Should drugs be necessary, as they often are in severe cases, one should not waste much time with coal-tar analgesics or other compromise measures, but resort at once to morphin, and in sufficient doses. It is infinitely better than the cocain or osmic acid or water injections or needle punctures, recommended by Corning, Bartholow, and others. There is the further advantage that the relief from morphin is constitutional, so to speak, no matter where the injection be given, whereas the other agents mentioned must be introduced locally and directly, a procedure not without danger, as shown by the experiments of Pitres and Vaillard, who recorded several cases of active traumatic parenchymatous neuritis superinduced by the employment of those methods. Phenacetin, antipyrin, and other kindred drugs sometimes prove temporarily alleviative, but, as a rule, they are disappointing in permanent effects. This is true also of the salicylates, colchicum, the iodids, and other antirheumatic drugs which have been used in these cases under the impression of an associated rheumatic etiology. The sulphur pack, the castor-oil plan, and other empirical measures are experimentally legitimate.

In obstinate and protracted cases the question of surgical interference by means of nerve stretching, section, or other operative procedure may force itself upon your attention. From personal experience and observation I urge upon you in this connection the utmost conservatism. Among other experiences almost invariably disappointing and disastrous, I do not easily forget a damage suit which I once narrowly escaped. I had advised nerve stretching as a last resort. A very competent surgeon stretched the nerve by subcutaneous operation, with the result, however, that a painful dis-

ability became an absolute paralysis, and for many months the patient was dependent upon crutches for all locomotion, the second state of that man being infinitely worse than the first. Stretching the nerve by forcibly flexing the thigh upon the abdomen is less dangerous, but equally painful, requiring an anesthetic. Do not forget in all cases to examine the urine for evidences of diabetic or gouty states, the blood for malarial and other parasites, the pelvis for tumors and other sources of intrapelvic pressure, the bones for hyperplastic disease, the blood-vessels for aneurisms or varicose dilatation, any of which may mechanically cause or aggravate a neuritis of the sciatic. Flat-foot may induce symptoms closely simulating sciatica, and I have known a change in the style or make of the shoe to effect a cure.

INTERCOSTAL NEURITIS

CASE IV.—The fourth patient, a male, aged 54 years, is of French ancestry, and of a most restless, nervous temperament. Thin, sallow, cadaveric almost in malnutrition, he tells a tale of marvellous endurance in various experiments. The type is familiar; the man “lives on his nerve.” Now and then such men break down, and while usually the break is in the mental sphere, sometimes it is motor, and occasionally these nervous super-strenuous individuals present entrancingly interesting examples of the sensory neuroses. Here, as in all neurology, the equation of temperament—the nervous individual equation—is tremendously important and should always be carefully and judiciously considered. This patient tells me that he has suffered twice previously from attacks of neuritis, both attacks involving the brachial plexus, the first eleven years ago, the second five years later. I find from the analysis of his urine an intensely lithemic state. The specific gravity is 1032, no sugar, but urea in extraordinary excess, 16 grains to the ounce. There is also an excess of indican and, microscopically, crystals of uric acid are abundant. Renal cells, traces of albumin, a few leukocytes, and a few blood-cells, with much mucus, are present as evidences of the mechanical irritant effect of these deposits. We know from pathologic research that similar mechanical deposits within the nerve sheath are not infrequently responsible for inflammatory (interstitial) affections of the intercostal and other nerves. To me it has always seemed a most plausible hypothesis, even without demonstra-

tion, and one which, more important still, has afforded, in several experiences, a successful therapeutic basis of treatment.

This patient's present trouble developed three weeks ago. He was out fishing, got wet, and wore his wet clothing for several hours. The following morning he awoke with a stinging, burning pain in the right side at the level of the sixth rib. The sensation was that of a red-hot wire running under the skin from the middle of the back to the median line in front. Within twenty-four hours an eruption, linear in distribution and corresponding to the area of pain, developed. It was vesicular in character and looked like a line of angry blisters. The local physician who was called in made the diagnosis of "shingles" correctly, but failed to recognize the neurologic basis, and treated the case from a strictly dermatologic stand-point. Salves, ointments, and washes failed of relief, and the sufferings of the patient became intense. I was called in consultation at this stage; aggravated insomnia, loss of appetite, and extreme emotional instability and irritability had been added secondarily to the picture.

Treatment.—Absolute rest in bed, gentle massage, forced feeding, and galvanism were ordered. The patient was put upon the following prescription:

R	Sodium salicylate	8 grains	20
	Codein	$\frac{1}{4}$ grain	015
	Quinin sulphate	1 grain	06
	Mix, and make one capsule.		

One such capsule was given every 4 hours. A lining of lamb's-wool fleece, which is rich in lanolin, was directed to be basted to the undershirt, skin side, over the affected area. A hypnotic powder of 10 grains (0.65 gram) each of trional, sulfonal, and sodium bromid was ordered. Forty-eight hours later everything was found to be going wrong; the nervous irritability, which was general and most aggravated, made the wool fleece intolerable, an uncontrollable restlessness interfered with the rest plan, and the hypnotic powder had not only failed to produce sleep, but had induced a collapse depression which was extreme. Both the electricity and the massage had aggravated the neuritic pain. I immediately changed front, ordered champagne every 2 hours; strychnin, $\frac{1}{25}$ grain (0.0025 gram), caffein, 1 grain (0.06 gram), and quinin sulphate, 2 grains (0.12 gram), every 3 hours; and modified rest. I abandoned elec-

tricity and the wool fleece, but directed that forced feeding should be pushed more actively and massage continued. The effect was almost magical. The patient began at once to improve and within a few days was sleeping well, eating well, and practically free from pain, although still annoyed by various hyperesthetic as well as paresthetic sensations within the area affected. He has since made a prompt and complete recovery.

Unless employed at the very beginning, local measures, in my experience, are utterly inadequate in these cases and often a source of aggravation. Blisters, ice, thermocautery, leeches, menthol and ether sprays, and poultices, if used at once, may do good, and indeed they sometimes arrest further progress. After the third or fourth day all such measures are worse than useless. I have never found any advantage in applying galvanism through the bare metal electrode, as recommended by some authors. Strapping the chest wall is at times helpful, but rarely necessary.

The selection of the left rather than the right intercostal is rather remarkable in these cases, and of some importance in that such cases involve the necessity of quite carefully excluding angina pectoris. So-called mastodynia in women is often, if not always, a variety of intercostal neuritis.

TIC DOULOUREUX

CASE V.—The fifth patient is the victim of one of the most vicious and intractable forms of neuritis known,—tic douloureux. Painful spasmodic disease of the fifth nerve is a competent definition. It is at the same time the most fascinating as a prognostic and therapeutic problem in each instance of all the varieties enumerated. The etiology is exceedingly varied. Sometimes it is due to trauma, again to cold, sometimes to infection, as from erysipelas or abscess. In other cases the cause is constitutional and the disease becomes one of the numerous nervous manifestations of the "uric acid diathesis," of gout, or of malaria or diabetes. Exogenous intoxications, as from lead, alcohol, opium, and arsenic may be the causative factor in special cases. Arterial degenerative disease, such as atheroma or fibrosis with associated nutritional disturbances, is a very common cause, explaining the extraordinary frequency with which the disease occurs in the aged. Why females should preponderate numerically is not so easy of explanation, though none the less a fact. Perhaps the factor of broad diminished neurologic

resistance is a sufficient explanation. I find in examining my records that, excluding traumatic cases, the females as compared with the males are as four to one. I find also from an analysis of the same records that 60 per cent. of my cases occurred in patients past the age of 50 years. Quite often in these patients there is disease of the kidneys with resultant inefficient sewerage and non-elimination of toxins, and it is sometimes difficult to determine the exact etiologic and allied therapeutic significance of the urinary findings. The urine should always and frequently be examined in all cases of tic douloureux, especially in the aged, and the findings should, to some degree at least, influence the treatment. Blood analysis, especially for infectious or parasitic invasion, should constitute a part of the routine study of these cases. Local conditions, such as carious teeth, alveolar disease, disease of the antrum, exostoses, malignant growths, suppurative disease of the internal ear or of the frontal sinus, of the nasal cavity, or of the eyes, are not infrequently found to be causatively or indirectly related to this affection.

Just here let me refer, with emphasis, to a fact of great importance in its bearing upon prognosis and treatment in this and all other sensory neuroses, and indeed in all the neuroses, motor and trophic, as well as sensory. Incidentally I might add that to an even greater degree, in importance as a fact, does it apply to the psychoses. Nerve function, especially when perverted, is peculiarly prone to habit tendencies. Starting in some local definite cause or in some equally positive constitutional state, a neurosis, motor, sensory, or vasomotor, quickly develops a habit tendency, which results in a continuation of the neurosis after the cause shall have ceased to act or shall have been removed, surgically or otherwise. Examples are both numerous and familiar in every-day experience. A fifth-nerve neuralgia may begin from a carious tooth. Let the tooth remain for a few days, then extract it. The neuralgia should logically disappear at once upon the removal of the cause. Sometimes it does; quite as often it does not. The result, the effect, has to be treated, not only by the removal of the cause, but independently as a separate entity. Epilepsy, especially the traumatic variety, affords another example in point. Let a given epilepsy be due to direct focal irritation at a certain circumscribed point, by a definite lesion, such as tumor, spicule of bone, or clot. Let such local cause remain for a few months, then remove it with the utmost

nicety of surgical precision and skill. The positive cause having been removed, the resultant effect—epileptic attacks—should cease; but do they? In my experience, a large one, the epileptic attacks frequently continue as often and as severely as before, and quite often the whole condition is aggravated. The same fact applies with equal importance to the tics. I have seen spasmodic torticollis due to a local condition continue after such causative condition had been removed. In reflex choreas due to local conditions, such as nasal disease, adherent prepuce, etc., again and again I have found it necessary to treat as a distinct entity the neurosis after the particular exciting cause had been removed. In my experience there is no exception in the entire field of the neuroses to this vicious habit tendency and its correlated lesson. It is this fact which, to my mind, sufficiently explains the limitations of surgery in neurology, so far as it affords a means to the end of curative treatment. Remove the spicule of bone or the tumor in epilepsy, have the carious tooth extracted in neuralgia, circumcise in the cases of adherent prepuce or phimosis, free the clitoris, remove the adenoids, operate for the nasal stenosis, correct the astigmatism, esophoria, or exophoria in chorea or migraine, but do not promise a cure from such procedure, and do not neglect to follow up such procedure with the routine treatment which would apply in an idiopathic (so-called) case. You will lessen the reproaches of conscience, and more important still, the reproaches of clients.

Treatment.—In the treatment of tic douloureux the recognition of this habit tendency has a twofold therapeutic significance: first, that already indicated in the preceding paragraph, which bears particularly upon this neurosis by reason of the frequency with which the surgeon in this disease enters the domain of the neurologist. Nerve stretching, nerve section, nerve extirpation, to the extreme of a central operation by the Hartley or Krause or other method, is quite common. From personal experience, as well as a careful, conservative study of statistics, I desire to go on record as protesting most energetically against such procedures, one and all, except in most carefully selected and appropriate cases and always as a last resort, all other methods and measures have been faithfully tried and the worst results from operation being discounted by a worse condition beforehand. Be sure that your patient first has had the benefit of a trial of every other method and found that his condition cannot be

made worse, no matter what the outcome, and in all cases promise no more with certainty than this. You will be wise and safe in proportion as you follow this advice.

There are many plans of treatment, any of which *may* succeed in individual cases of tic douloureux. A careful study of the personal equation, as indicated by heredity, environment, physical habits, etc., may be and usually is decidedly helpful in determining the special plan you will follow in a particular case. Some patients bear anodynes badly, other patients are intolerant of stimulants. Assuming that you have eliminated local causes, constitutional states, and reflex irritations, or that you have properly discounted them and are still short of relief for your patient, several empirical plans remain available: First, there is the castor-oil plan. I do not know how it proves effective, and your explanations are as good as mine, so we will not exchange theories. Daily doses of an ounce or two (30 to 60 c.c.) for a week or ten days have, however, occasionally proved effective. So far as I know, there seem to be no special indications which afford a guide in individual cases. If all other methods have failed it would seem legitimate to try the castor-oil plan. Dana's treatment with rapidly progressive and massive doses of strychnin I have found, in a few cases, marvellously happy in results. It should always be given a trial. The patient should be put to bed and on a full nutritious diet with milk-cream mixtures, to the extreme of tolerance, in addition. The strychnin should be given at first, and preferably hypodermically, in doses of $\frac{1}{40}$ grain (0.0015 gram) every 4 hours; on the second day, $\frac{1}{30}$ grain (0.002 gram) every 4 hours; on the third day, $\frac{1}{20}$ grain (0.003 gram); on the fourth day, $\frac{1}{16}$ grain (0.004 gram), and on the fifth day, $\frac{1}{12}$ grain (0.005 gram). If no result is obtained by the end of the fifth day, then no result, in my experience, is likely to follow a continuance of this plan. I recall two cases, one referred to me by Dr. T. Kelly, treated at the Polyclinic Hospital, the other referred to me by Dr. Charlton Wallace, both successfully and promptly cured by this plan when everything else had failed. Both cases, if I remember correctly, were referred to me for advice as to the operative procedure and the operator advisable under the circumstances.

There are other methods more or less empirical which may be tried, of less probable value in results, including aconite, gelsemium,

colchicum, potassium iodid, and other drugs,—with the details of which I shall not burden you.

My own plan, for which I claim some originality in conception, is as follows: Assuming all local and constitutional predisposing and exciting causes to have been removed and all clearly indicated plans of treatment in individual cases to have been tried and found wanting, I put the patient upon the following general plan of treatment. First, as to electricity. I always use galvanism and the continuous current, introduced through the rheostat, and guided, as to quantity, by the meter. One electrode, it makes no difference which, is applied back of the neck, the other over the face affected. Both are broad Erb electrodes, as large as possible, diffusion of current at the point of contact being desirable. The current is introduced through the rheostat, gradually from a minimum up to 3 or 5 or 7 or 10 milliamperes, without interruption or shock. Never aggravate the pain by the current. The séance lasts from 10 to 20 minutes. Following this treatment the face is massaged gently with lanolin, and in severe cases I have applied afterward a face mask or hood, to be worn day and night, lined with lamb's-wool fleece. With a full faith in my belief as to the importance of neurotic or neuritic habit tendencies, I apply this faith in works along the lines of the following theory and plan. Facial painful tic is primarily a disease of the fifth nerve. Very soon the disease of the fifth induces a sympathetic or associate implication of the seventh nerve, through which the motor tic is added. The seventh forms the habit of "ticing," so to speak, this in turn keeps up the painful irritability of the fifth, a vicious cycle being the result, cause becoming effect, and *vice versa*. Removal of the cause of the painful neuritis of the fifth, which started the motor tic of the seventh, not being sufficient to break up the habit, I begin on the motor habit. I put the patient upon full doses of hyoscin hydrobromate, $\frac{1}{100}$ to $\frac{1}{50}$ grain (0.0006 to 0.0013 gram), twice or three times daily. I stop the tic by this means and eliminate the continued source of irritation of the sensory fifth nerve. Having controlled the tic, I put the patient upon one of the following prescriptions:

R	Sodium salicylate	8 grains	0 2
	Quinin sulphate	1 grain	0 06
	Codein	$\frac{1}{4}$ grain	0 015

or

R	Sodium salicylate	8 grains	0 2
	Heroin	$\frac{1}{16}$ grain	003

The anodyne is gradually reduced within a few days, and I then put the patient upon an active tonic constructive: strychnin, $\frac{1}{30}$ grain (0.002 gram); quinin sulphate, 1 grain (0.06 gram), and iron carbonate or Bland's mass, 5 grains (0.3 gram). I have tried various mechanical measures, strapping the face with adhesive strips, painting it with collodion thickly, in the effort to control the tic, but with only occasional and temporary success. All such measures are inferior in results to the action of the hyoscin. I have the records of four cases of tic douloureux, which had failed to respond to almost every other method of treatment, in which this plan was employed successfully. I have withheld detailed histories of these cases for the double reason that they would needlessly lengthen the lecture and because they form the basis for a separate paper, in preparation, upon this special subject. Let me say in conclusion as to the subject, that it is no one measure, but by the observance of all details that the best results are obtained in the treatment of the non-traumatic, non-reflex cases of tic douloureux.

BRACHIAL NEURITIS

CASE VI.—The sixth patient has a neuritis of the brachial plexus, the result of trauma. His history is as follows: A. B., aged 44 years, and an American. His family and personal history is negative in every respect. On February 16 last, in attempting to board a rapidly moving car, this patient was jerked violently from his feet, clinging to the guard-rail with his right hand. Regaining his foothold he jumped on the car, and in a violent rebound struck his right shoulder viciously and with force against the iron upright of the gate. He felt severe local pain and tenderness immediately, at the point of impact, over the deltoid, but did not consider it of importance until two days later, when, finding the pain still persistent and increasing and some disability developing in the use of the arm, he sought medical advice. Unfortunately, a superficial examination or a deficient knowledge led to the opinion that the entire trouble consisted of a muscular strain with the correlated advice to use counterirritant liniments, etc. At the end of two weeks, his suffering and disability having continuously increased, he was referred to me. On examination I found no evidences superficially of the injury in discoloration or swelling. The arm, on the contrary, especially at the shoulder, in the area of the deltoid group,

showed distinct atrophy by contrast with the opposite side. There was pain and tenderness on pressure over the acromiion process and just over the joint. This pain extended down the arm in a line along the outer surface to the elbow, chiefly in the distribution of the circumflex, and from the elbow it corresponded to the distribution of the ulnar. There was no pain below the wrist, but numerous paresthesias, particularly tingling and formication in the little and next finger. The response to the galvanic current was of the irritative character, but no reaction of degeneration was present. There was considerable limitation of motion from pain and some actual diminution of power in the deltoid elevators and in the flexors and extensors in resisting forced movements with slightly impaired hand grasp on the right. The patient insisted upon attending to business daily, but agreed to wear the arm in a sling, my object being thereby to keep him constantly reminded not to use it.

Treatment.—A lining of lamb's-wool fleece was basted to the undershirt, over the shoulder, and covering the arm nearly to the wrist. Daily inunctions of lanolin by very gentle massage were ordered, and the patient was given a prescription containing in each dose, codein, $\frac{1}{4}$ grain (0.015 gram), sodium salicylate, 3 grains (0.2 gram), and quinin sulphate, 1 grain (0.06 gram), in capsules; one capsule every four hours. He was also treated with galvanism daily, one electrode, 2 x 4 inches, heavily protected, back of the neck, the extended hand resting comfortably on the other electrode, which was of the same size. The current was introduced very cautiously through the rheostat, and for the first three or four treatments the quantity was not allowed to exceed 3 milliamperes. Gradually the current was increased as sensitiveness diminished to 4 or 5, and finally 8 milliamperes. This patient, although improvement began in a few days, was tardily responsive, and nearly seven weeks of treatment was required to effect a cure. Even now, as is often the case in neuritis, by the way, he is quite forcibly reminded of his past painful experiences, after any unusual physical exertion or depressing fatigue, or by certain humid atmospheric and barometric conditions. In many cases, for years afterward, patients who have had neuritis, toxic or traumatic, can foretell a storm with quite as much accuracy and discomfort as the chronic rheumatic, and overexertion or fatigue from any cause brings a reminder in a sciatic ache or a brachial tire.

One aspect of this last sub-subject demands special considera-

tion, because of its medico-legal bearing and importance. I refer to traumatic neuritis, the result of accidents which constitute the basis for damage suits. Next to so-called railway spine it is perhaps the most frequent allegation in the bills of complaint of suitors for damages in railroad and other accident actions. A large proportion of these cases are fraudulent, of course, but by no means all. It is quite as important in the interests of justice and humanity to protect the honest litigant as to expose the malingerer. There are several quite nice points of diagnosis with which you should be familiar in this connection. In the first place, the important fact should not be forgotten that subjective symptoms are relatively valueless and suspicious, especially before a jury, while objective demonstrable symptoms are positively convincing in medico-legal practice. Pain, weakness, paresthesia, anesthesia, and analgesia are all subjective and may be simulated by the malingerer to the utmost extreme degree. Atrophy, especially if marked, altered reflexes, trophic disturbances, such as herpes, bullæ, ulcers, loss of hair or nails, and altered electrical reactions are genuine and indisputable symptomatic phenomena. Atrophy is, to the trained expert, much more certainly determined by the sense of touch than by vision. The harpoon test with histologic examination of the muscle tissue is advisable in doubtful and important cases. The altered electrical reaction is also positive in significance and is at all times of decisive importance. Alteration of the normal polar formula of Erb in the qualitative response to the galvanic current is positive evidence of nerve degeneration and therefore of organic damage. Quantitative alterations to the faradic current are less positively significant alone, especially as to permanency of injury. On this issue of electrical reaction alone I once won for a patient a suit for damages in a case of traumatic neuritis. Sensory symptoms, no matter how extreme in degree, are always suspicious if there are no associated and demonstrable motor, trophic, or vasomotor symptoms, or altered electrical reactions. In a recent medico-legal experience, a litigant, who was a malingerer of most aggravated auto-suggestive type, claiming loss of temperature sense, allowed a match to burn to total consumption resting on his bare skin, without a quiver of a muscle or the slightest sign of painful perception in any way, the fact of malingering being easily demonstrable by a dozen tests which were successfully employed. True muscular atrophy and altered electrical reactions cannot be simulated, and are of positive value, therefore, in medico-legal cases.

Progress of Medicine

DURING THE YEAR 1903

MEDICINE

BY DAVID L. EDSALL, M.D.

Associate in Medicine in the University of Pennsylvania; Associate in the William Pepper Laboratory of Clinical Medicine; Physician to the Episcopal Hospital and to St. Christopher's Hospital for Children, Philadelphia

INFECTIOUS DISEASES

TUBERCULOSIS

THE last twelve months have brought forth a number of extremely important articles on tuberculosis, as did the preceding year. Those that have excited most interest, on account of their extreme importance, if the conclusions reached are at all correct, are the articles by v. Behring.¹ This author refers to his previously published work on the inoculation of cattle with an attenuated human culture. The results with cattle cannot be discussed here, except to say that the injections produced immunity to subsequent large doses of virulent tubercle bacilli. Similarly important results have been obtained by Pearson and Gilliland and by others, and this work is likely to be of the utmost value from an economic stand-point.

The chief medical interest in v. Behring's publications relates, at present, to his statements concerning the method of infection and the source of infection in tuberculosis. He expresses the opinion that infants are far more subject to infection than others, and even insists that the vast majority of infections occur during infancy. He takes the remarkable ground that the milk consumed by infants is the chief source of all tubercular infection, directly opposing Koch in this view. To substantiate this, he reports that he has determined that albuminous bodies pass the intestinal mucous membranes of newly born ani-

¹ Berl. klin. Woch., March 16, 1903, and Deut. med. Woch., Sept. 24, 1903.

mals unchanged. He has also shown that both virulent and attenuated anthrax bacilli pass the mucous membrane of the digestive tract in very young animals, and produce results in consonance with their virulence, while in older animals infection with anthrax cannot be produced by this method. He has also demonstrated the same to be true of tubercle bacilli, these bacilli passing the intestinal mucous membrane of very young guinea-pigs without producing any local lesions. The first lesion noted by him was tuberculosis of the cervical glands; later, there were the appearances that are commonly considered to be characteristic of inhalation-tuberculosis in guinea-pigs. He believes that intestinal infection may produce lesions usually thought to be characteristic of respiratory infection, and that the intestine is the main source of infection. He also presents experimental evidence that tuberculosis acquired in early life may for a long time remain latent. He insists that milk should be pasteurized at its place of production in order to destroy any tubercle bacilli present. He also recommends that when adults exhibit any disturbance of digestion they should be especially protected from invasion by tuberculosis, because the possibility that the bacilli may pass the digestive tract is then particularly great. Behring emphasizes his belief that it may be possible to produce in cows' milk immune substances that may be administered to human subjects, especially to infants, to protect them against the development of tuberculosis. His statements are of evident importance. They must, however, be received with a good deal of caution, as they need confirmation in many ways.

Some remarkable results concerning the frequency with which tubercle bacilli may pass the intestinal mucous membrane without causing any lesion of the mucous membrane itself are described by A. Macfadyen and A. MacConkey,¹ who examined the mesenteric glands from a series of 28 cases in which there was no gross evidence of tubercular disease of the intestine. Eight of the patients had tuberculosis elsewhere but the other 20 had no gross evidence of tuberculosis. All the subjects were children, and all but 2 were under five years of age. Virulent tubercle bacilli were present in 10; in 5 of these there was evident tuberculosis elsewhere, but, most striking of all, in 5 persons that were supposed to have been entirely free from tuberculosis (that is, in 25 per cent. of the "non-tuberculous" persons examined) virulent bacilli were present. One of the positive cases mentioned was a still-born child.

The importance of such observations needs no emphasis. It may

¹ Brit. Med. Jour., July 18, 1903.

fairly be stated that the active and wide-spread work excited by Koch's paper at the London Congress has sufficed to demonstrate that his statements were unjustified. The pendulum has now swung to the other side, and all the best evidence indicates that bovine tuberculosis is of much consequence, that infection through the intestinal tract is more important than was previously supposed, and that we should increase, not decrease, our efforts to control infection from cattle. Until, however, the contrary has been more successfully demonstrated than it has as yet been, we must hold to the view that the path of infection that is much the most common is that through the respiratory tract.

Macfadyen and MacConkey¹ also made some observations on 44 adenoids and 34 tonsils, all of which were entirely negative; and S. Ito² has likewise investigated 104 cases with reference to tuberculosis of the tonsils and of the other lymphatic tissues of the pharynx and the nasopharynx, finding no evidence of primary tuberculosis in any of these cases. Secondary tuberculosis was discovered in only 5 tonsils, and 2 pharyngeal tonsils, in the epiglottis in one instance, and in the glands of the tongue in another. Such results make the importance of direct infection through the tonsils much more problematic than many authors have in recent years considered it to be.

A number of French writers have for the last few years maintained that there is in those predisposed to phthisis a loss of mineral substances from the tissues and body-fluids, and that this loss constitutes the main element in "predisposition" to phthisis and is a fact of marked importance in the treatment of that disease. A. Ott³ has made some very careful investigations of this question, determining accurately the intake and the outgo. He has found that in advanced phthisis there is often a loss of minerals from the tissues, but that this is not a constant symptom, even in the advanced stages; it is not at all characteristic of the early stages; and it occurs in many other diseases. It, therefore, bears no specific relation to tuberculosis.

E. Hubschmann and O. Stross⁴ and Schur⁵ have reported interesting cases that are of importance in relation to the question concerning the nature of Hodgkin's disease. The authors of both papers, particularly Schur, incline to the view that Hodgkin's disease is not always tuberculosis of the lymph-glands; and Schur, especially, be-

¹ L. c.

² Berl. klin. Woch., Jan. 12, 1903.

³ Zeit. f. klin. Med., Bd. 1, Hefte 5 and 6.

⁴ Deut. med. Woch., May 21, 1903.

⁵ Wien. klin. Woch., 1903, No. 5.

lieves that it is possible, by carefully observing minor symptoms, by making frequent examinations of the blood, and by searching for tuberculosis elsewhere, to distinguish the two conditions clinically. This view is, in the main, certainly acquiesced in at present by most writers and investigators. Since interest in the question was aroused by the publications of Sternberg and, in this country, of Musser and Sailer, a good deal of investigation has been pursued, and there have been collected a large series of cases of Hodgkin's disease in which evidences of tuberculosis were entirely absent.

In connection with the diagnosis of tuberculosis, the report of S. Rosenberger¹ is of interest. He describes 2 cases in which tuberculin was injected for therapeutic purposes, and in which the injections were followed by grave collapse that was almost fatal, and by other marked symptoms of poisoning. It could not be determined that the tuberculin was defective, but the author believes that it produced the grave toxic symptoms. He makes the suggestion that when tuberculin is used for diagnosis or for therapy, any new supply should always be first tested by using very minute doses, in order to make sure that it will have no unfavorable effects. This suggestion may wisely be followed, even though the author's results stand isolated among thousands of cases in which no unfavorable effects have been observed.

A. Schmidt² refers to several points that are of practical interest, in that they are likely to lead one to make an erroneous diagnosis of tuberculosis. He especially mentions asymmetric development of the shoulder-muscles, which, particularly upon percussion, may give signs of shrinking of one apex. This error can be excluded by making a proper examination. The author also refers to cases in which hemorrhages occur occasionally throughout a long period when signs of tuberculosis are absent. He believes that these hemorrhages are usually due to small bronchiectases, and thinks that the condition is not rare. He finally emphasizes the fact that one may occasionally hear fine râles about the borders of the lung in persons that are entirely healthy, and that these râles are likely to give rise to the fear that the person has tuberculosis. This is especially prone to be the case in scoliosis. The fact that the râles are not due to disease of the lung may be determined by making repeated examinations, by noting that they are not influenced by coughing and are situated only along the borders of the lung, and by observing the absence of all other signs of pulmonary disease.

¹ Zent. f. inn. Med. May 14, 1903.

² Deut. med. Woch., Oct. 1, 1903.

There have appeared a number of articles on methods by which the apices may be accurately outlined, all of which are similar to the method described some years ago by Krönig. Wolff and Michaelis,¹ A. G. Auld,² R. W. Philip,³ and E. H. Colbeck⁴ all discuss this matter. While their methods differ in certain minor details, their main points are those that were brought out by Krönig, who insisted that the outline of the pulmonary resonance above the clavicle and across the shoulders should be accurately determined, and that differences, in this region, between the two sides are often important in the early diagnosis of phthisis. All the authors mentioned emphasize the necessity of examining these areas accurately, and the writer has frequently had occasion to realize its importance.

A number of observations of extreme importance have appeared within the last few years, in which the presence in the sputum of bacilli that were not tubercle bacilli but that had the staining reactions of tubercle bacilli was demonstrated. Such cases have been described during the last twelve months by E. Lichtenstein,⁵ Milchner,⁶ and A. Fraenkel.⁷ The first two cases mentioned, especially the first, are of great importance in this connection, because the course of the disease in many ways resembled that of tuberculosis. Such observations have demonstrated that there is danger of going astray in occasional instances, through depending upon what was once thought to be absolute proof,—i.e., the discovery in the sputum of bacilli with the characteristics of tubercle bacilli. Lichtenstein believes that these bacilli can be differentiated from tubercle bacilli by decolorizing with acid alcohol; but this is not an entirely satisfactory distinction. Rosenberger, in an article, as yet unpublished, read before the Philadelphia Pathological Society, stated that all pseudotubercle bacilli may be distinguished from tubercle bacilli by means of glacial acetic acid or sweet spirits of nitre,—a fact that, if substantiated, will prove to be of great clinical importance.

In studying the prognosis in tuberculosis, L. Brown⁸ has noted the character and the number of the tubercle bacilli in the sputum, and has reached the conclusion that these are of no great consequence

¹ Deut. med. Woch., Feb. 5, 1903.

² Lancet, Feb. 14, 1903.

³ Practitioner, Jan., 1903.

⁴ Practitioner, March, 1903.

⁵ Zeit. f. Tub. u. Heilst., Bd. iii, p. 193.

⁶ Zent. f. inn. Med., 1903, p. 410.

⁷ Ibid.

⁸ Jour. Amer. Med. Assoc., Feb. 21, 1903.

in prognosis, the general symptoms and the local signs being much more accurate guides. This author has also ¹ made a painstaking and prolonged study of the weight of persons with pulmonary tuberculosis, which is of consequence in relation to both prognosis and treatment. After having studied 1200 weight-charts carefully, he has concluded that forced muscular exercise is always injurious, but that regulated rest and exercise are elements of great importance in improving the body-weight. A rapid and continuous loss in weight is one of the surest indications of an evil prognosis. A gain of a few pounds is of little consequence, but a constant gain over a period of two months is usually an extremely favorable sign. Cold weather seems to stimulate assimilation and gain in weight more than does warm weather.

TYPHOID FEVER

There have been a number of observations of practical interest concerning the transmission of typhoid fever. M. T. Sudler ² gives a description of the epidemic that occurred at Ithaca, in which there were 681 cases with 51 deaths. The author directs attention to the fact that the infection was apparently shown to have come from one definite source of water-supply. The whole epidemic could have been prevented had the city authorities acted upon information previously furnished them that this water-supply was contaminated. R. H. Hutchings and A. W. Wheeler ³ also report an interesting epidemic that was observed at the St. Lawrence Hospital; 39 cases occurred and the ice-supply was shown to have been the source of infection.

P. Horton-Smith ⁴ describes a series of cases in which he believes that direct household infection occurred in persons that had come into close contact with those sick of the disease. I have made a similar observation within the past year. A. Hamilton ⁵ has made an important study of the conveying of typhoid fever by means of the house-fly. The recent epidemic in Chicago was by far most severe in one ward, and in this ward the sanitary appliances were extremely defective. The author studied bacteriologically flies caught about houses and privies and in the rooms of typhoid-fever patients in this region. In 5 of 18 instances she recovered typhoid bacilli; and she decides that flies are very important in disseminating typhoid fever when the sanitary ar-

¹ Amer. Med., April 25, 1903.

² Phila. Med. Jour., April 11, 1903.

³ Amer. Jour. Med. Sci., Oct., 1903.

⁴ Lancet, April 11, 1903.

⁵ Jour. Amer. Med. Assoc., Feb. 28, 1903.

rangements are defective. D. Turner ¹ describes a number of clinical instances in which it seemed probable that typhoid fever had been carried by flies.

In consequence of Koch's emphatic view, that typhoid fever must be combated by preventing the original spread of the disease from the patient, several of his students have undertaken investigations to demonstrate the possibility that many foods may become infected and that there may be almost uncontrollable difficulties in holding the infection within bounds after it has once passed beyond the patient. C. Bruck ² studied the question of typhoid infection of butter, and has found that typhoid bacilli may readily be recovered as long as 27 days after the butter has been infected. Butter, then, is evidently a possible source of infection. This author notes, also, that when milk is infected with typhoid bacilli, the cream and butter from that milk contain many more bacilli than do the skim-milk and the buttermilk. K. Bassenge ³ finds that heating milk for five minutes at 60° C. will kill all typhoid bacilli present. Earthenware vessels are the most satisfactory for this purpose, because in them heating progresses slowly. The author also refers to the danger of infected butter. A large amount of fatty acid present in the milk or the butter will kill the bacilli.

C. A. Ewald ⁴ states that typhoid fever has grown less severe in Berlin during recent years. He mentions the difficulty in distinguishing this disease from acute miliary tuberculosis, from acute septic endocarditis, and from some cases that he has seen of very acute dysentery without stools of a dysenteric character. He notes that the diazo reaction was entirely absent in 29 of 56 cases of typhoid fever. The latter observation is of interest in connection with the paper of J. S. Billings, Jr., ⁵ in which 369 observations are reported, the author reaching the conclusion that the reaction is of value from the negative stand-point, as it is rarely absent in typhoid fever, and occurs much earlier than does the Widal reaction. Ewald's view that the reaction is unreliable is certainly correct. I have repeatedly seen it absent in typhoid fever. E. Adler ⁶ discusses a method of diagnosis that is worthy of mention in order that it may be condemned. This is puncture of the spleen. The author reports extremely successful results by using this method, but there is certainly sufficient danger connected

¹ Australasian Med. Gaz., Feb. 20, 1903.

² Deut. med. Woch., No. 26, 1903.

³ Deut. med. Woch., Sept. 17 and 24, 1903.

⁴ Berl. klin. Woch., Jan. 26 and Feb. 2, 1903.

⁵ N. Y. Med. Jour., April 18, 1903.

⁶ Deut. Arch. f. klin. Med., Bd. lxxv, Heft 6.

with it to make it unworthy of recognition. Adler claims that this is not true. He, however, advises so many precautions in order to avoid danger that he practically contradicts his own statement. He makes the correct observation that in doing Widal reactions repeatedly on suspected cases it is extremely important to note a decided increase in the intensity of successive reactions. For instance, when it has previously been absent in a dilution of 1 to 10 or less, its appearance later, even in such a dilution, is important evidence of the presence of typhoid fever.

F. A. G. Murray¹ reports a case of typhoid fever complicated with Ludwig's angina which ended fatally through edema of the larynx. I have seen one case presenting the same course and ending in the same way after tracheotomy. It is a most dangerous, but, fortunately, rare complication. E. J. Stolkund² reports a case in which there was apparently coincident infection with typhoid fever and influenza. The clinical course indicated this; the sputum contained influenza bacilli; the Widal test was positive; and there were in the same house at the time two cases of typhoid fever and two of influenza. This observation is of interest, less, perhaps, on account of the rarity of this observation, than because of the comparative frequency with which the typhoid fever begins with influenza-like symptoms but soon develops into distinct typhoid fever.

PARATYPHOID FEVER

There have been a number of interesting observations concerning this group of infections, and it is now classed as a distinct form of disease that can be separated clinically from typhoid fever, chiefly, of course, by agglutination tests. K. Kayser³ reports 3 cases. J. H. Pratt⁴ also describes 3 cases. Pratt's first case was interesting on account of the occurrence of suppurative orchitis; the second, on account of the presence of cholelithiasis; and the third, because of the development of saphenous phlebitis. In the first case, *Bacillus paratyphosus* was isolated from the pus; in the second, from the gallstones. H. W. Allen⁵ describes 3 cases, suppurative cholecystitis appearing during convalescence in the first and cystitis complicating the second. In the second case thrombosis of the left femoral vein also occurred. These cases are additional evidence of the frequency of complications in paratyphoid infections.

¹ Amer. Med., March 9, 1903.

² Zent. f. inn. Med., Aug. 15, 1903.

³ Deut. med. Woch., April 23, 1903.

⁴ Boston Med. and Surg. Jour., Feb. 5, 1903.

⁵ Amer. Jour. Med. Sci., Jan. 1903.

PNEUMONIA

A. R. Reynolds¹ emphasizes the great importance of the increasing prevalence of pneumonia, presenting figures to show that deaths from this disease have increased 346.6 per cent. since 1860, in contrast with the phthisis mortality which has decreased 39.5 per cent. He states that since 1900 pneumonia has caused one-eighth of all deaths in Chicago. He insists that active precautions, similar to those employed in diphtheria, should be adopted to prevent the spread of pneumonia, and that places used for public gatherings should be especially watched and maintained in good condition. To stop the progress of the disease, it is essential that the public should be educated to recognize the importance of hygienic measures. W. Müller,² in a study of the bacteria in pneumonia, makes an interesting reference to the possibility that mixed infections may produce characteristic variations in the course of the disease. He was, however, unable to find that any characteristic type of fever or course of the disease was associated with any special form of secondary infection. L. A. Conner and G. A. Dodge³ contribute an interesting study of the physical signs in lobar pneumonia as observed in 392 cases. They particularly refer to the fact that in 79 per cent. of those admitted early in the disease they found a weak respiratory murmur over the affected area. This is the most frequent of the early signs. Next after this is circumscribed impairment of resonance; next, the crepitant râle; and after this, a slight increase in the clearness and intensity of the vocal resonance. The authors also present some interesting observations concerning the physical signs in the course of the disease and during convalescence. They believe that the condition called central pneumonia is not a consolidation beginning in the depths of the lung and discoverable only when it has progressed to the surface; they think that in such cases there is really a consolidation that progresses but slowly to completion. D. J. Milton Miller⁴ reports a case of femoral thrombosis complicating convalescence from pneumonia. He has found 44 such cases in medical literature.

PNEUMOCOCCUS SEPTICEMIA

Many reports demonstrate that infection with *Diplococcus pneumoniae* elsewhere than in the lungs is much more frequent than it has, until within recent years, been suspected to be. G. Parker¹ describes

¹ Jour. Amer. Med. Assoc., Feb. 28, 1903.

² Deut. Arch. f. klin. Med., Bd. lxxiv, Hefte 1 and 2.

³ Amer. Jour. Med. Sci., Sept., 1903.

⁴ Phila. Med. Jour., May 16, 1903.

a case in a child. After an illness of several weeks the patient died, and autopsy showed mediastinitis, resolving pneumonia, and pericarditis. Pneumococci were recovered from cultures made from various organs. Baduel and Gargagno² describe an epidemic of pneumococcus infections involving 11 persons in one household; they mention 3 cases of pneumonia, 4 of bronchitis, one of gingivitis, one of parotitis, and one of catarrhal sore-throat. The authors state that in all but one case they obtained cultures of pneumococci from the circulating blood. Several of the cases were so slight that ordinarily they would not have been observed. I have recently made a similar though less extensive observation in a hospital ward. R. M. Slaughter³ describes a case of pneumococcic arthritis, which, he believes, makes the total of such cases 68. In this patient the arthritis attacked a tuberculous joint. The author recommends that amputation be carried out when the pus escapes from the joint and forms sinuses.

RHEUMATISM

E. W. A. Walker⁴ has studied 15 cases, finding in them the micrococcus described by Poynton and Paine. Eight of these cases were acute rheumatism, 3 chorea, and the other 4 with malignant endocarditis in rheumatic subjects. Inoculating rabbits with this micrococcus produced arthritis and endocarditis, and, at times, pleurisy and septicemia, repeated attacks being produced by repeated inoculations in the same animal. The author believes that the organism is often not of diplococcic form, but is a streptococcus. He thinks, however, that it is specific. C. Philipp,⁵ on the contrary, has investigated 31 cases of rheumatism, examining the blood and, in some instances, the fluid from the joints, and has reached the conclusion that the methods now in use do not demonstrate the presence of any micro-organism in the circulating blood, and that injection of the blood itself does not produce symptoms like those of rheumatism in the various animals investigated. He obtained suggestive results by inoculating a calf, however, and suggests that this animal may be susceptible to acute rheumatism and useful in the study of the disease. He believes that rheumatism is a *morbus sui generis*. F. Meyer⁶ insists that rheumatism is a peculiar variety of infection due to a streptococcus. He bases his

¹ Brit. Med. Jour., May 9, 1903.

² Gazz. degli. osped., 1903, No. 2.

³ Amer. Med., April 18, 1903.

⁴ Practitioner, Feb., 1903.

⁵ Deut. Arch. f. klin. Med., Bd. lxxiv, Hefte 1 and 2.

⁶ Zeit. f. klin. Med., Bd. xlv, Hefte 5 and 6.

conclusion on his previous work and some later investigations, having, in all, the records of 25 cases of sore-throat accompanying polyarthrititis and one case of rheumatic verrucose endocarditis. In this connection, I may refer to Menzer,¹ who reports suggestive results from the serum-treatment of acute and chronic rheumatism, employing a serum that he has himself prepared from streptococci isolated from the throats of rheumatic subjects. His results are, however, at present only suggestive.

VARIOLA

The chief interest in connection with this disease during the past year has been in the report by W. T. Councilman, G. B. Magrath, and W. R. Brinckerhoff,² who consider that they have demonstrated definitely that the cell-inclusions found in variola are living parasites, and that these pass through two life-cycles in variola. The latter point they think distinguishes this disease from vaccina, only one life-cycle being observed in the parasites in the latter disease. The two cycles in variola are intracellular and intranuclear, the last-mentioned being the peculiar variolous cycle. The changes occurring in the objects that the authors believe to be parasites can be mentioned only briefly. They consist chiefly in alterations from small, structureless bodies to large, ameboid objects, followed by segmentation with the production of small, round bodies. The intracellular bodies then disappear, and small, intranuclear bodies make their appearance. The authors believe small-pox to be due to these parasites. Another claim concerning the etiology of this disease is that of W. Dombrowski,³ who has found in the early stages an apparently pure culture of a small, round micro-organism. Later, many larger bodies appeared, and these increased in number. The author believes that they develop by budding, and that they belong to the order of blastomycetes and are probably pathogenic.

MALARIA

An interesting observation concerning the transmission of malaria is that of N. Jancso,⁴ who, while carrying out some observations concerning the development of malarial parasites in the mosquito, noticed the appearance of a small hospital epidemic of malaria,—this disease being ordinarily uncommon in that region, particularly at that time of

¹ *Zeit. f. klin. Med.*, Bd. xlvii, Hefte 1 and 2, and *Cent. f. inn. Med.*, 1903, p. 410.

² *Jour. of Med. Research*, May, 1903.

³ *Zeit. f. klin. Med.*, Bd. xlvi, Hefte 1-4.

⁴ *Deut. Arch. f. klin. Med.*, Bd. lxxvi, Hefte 5 and 6.

the year (late in November). He found that, owing to the carelessness of an attendant, some of his infected mosquitoes had escaped, and a number of these anopheles were found in the rooms and wards in which the disease had developed. He insists upon the necessity of care in doing experimental work of this kind. R. Ross¹ describes a new method for the microscopic diagnosis of malarial fever. He considers this method important, because it permits of inspecting a large amount of blood within a short time. He makes a rather thick smear of a large drop of blood, spreading it with a needle. He then dries it in the air, without fixing, and lays, by means of a glass rod, some aqueous eosin solution over the film. He next washes it off very gently after fifteen minutes. He then runs a weak solution of methylene-blue over the surface and washes this after a few seconds. He states that very satisfactory results may be obtained by this method. R. Ruge² recommends the method as a valuable one; but he has had difficulty with it, because the blood smears washed off. He recommends fixing in a 2 per cent. solution of formalin containing 0.5 to 1 per cent. of acetic acid. He states that the same purpose can be accomplished with this modification, since it permits of the removal of the hemoglobin. J. Koreck³ recommends for staining malarial organisms the use of a mixture containing 0.5 gram of collargol in 100 c.c. of 1 per cent. methylene-blue solution, the mixture being filtered and eosin being subsequently added. Acetone he also finds to be a useful addition.

M. Luzzato⁴ reports the occurrence of malarial hemoglobinuria in several members of one family, and believes that the complication was due to hereditary predisposition. Mann⁵ describes a case in which there was a coincidence of malarial hemoglobinuria and uncinariasis, considering this case to support Koch's belief that black-water fever occurs only when some other influence than malaria has already damaged the red corpuscles. T. H. Delany⁶ insists upon the importance of an increase in the large mononuclears in the diagnosis of malaria. In suspicious cases, a percentage of large mononuclears above 12 is, he believes, extremely important, and he thinks that in this way a conclusion can be reached more rapidly, in many instances, than by looking for parasites. He considers the presence of a leukocytosis in a suspicious case in the tropics to be almost diagnostic of liver-abscess as

¹ *Lancet*, Jan. 10, 1903.

² *Deut. med. Woch.*, March 19, 1903.

³ *Deut. med. Woch.*, April 23, 1903.

⁴ *Rif. med.*, Feb. 11, 1903.

⁵ *Deut. Arch. f. klin. Med.*, Bd. lxxiv, Hefte 5 and 6.

⁶ *Brit. Med. Jour.*, March 28, 1903.

against malaria; but he finds that leukocytosis does occasionally occur in uncomplicated malaria, and that it then usually indicates a grave infection.

MISCELLANEOUS INFECTIOUS CONDITIONS

MALTA FEVER.—C. F. Craig¹ discusses Malta fever in the United States army, and insists that it is important to recognize that this disease occasionally occurs in this country, particularly in those that have been in the tropics. He has seen 4 cases in the Presidio at San Francisco within a few months, the diagnosis having been established by the agglutination test with *Micrococcus melitensis*. He especially notes the danger of confusing this disease with typhoid fever or malaria when it is acute, and with articular rheumatism when it has become more chronic. The diagnosis cannot be positively established without the agglutination test.

SLEEPING-SICKNESS.—Some extremely interesting observations have been made upon sleeping-sickness, with two claims as to the cause of that disease. A. Castellani² and A. Bettencourt, A. Kopke, G. de Resende, and C. Mendes,³ the latter four being members of the Portuguese Commission for the investigation of this disease, reported that sleeping-sickness is probably due to a streptococcus, since they have found this organism in the blood and in the nervous system, and, by lumbar puncture, in the cerebrospinal fluid. Castellani thinks that his organism differs from that described by the Portuguese Commission. Later, however,⁴ he retracts his earlier statements as to the etiology of the disease, and reports having found a trypanosoma in the cerebrospinal fluid in 20 out of 34 cases. In 12 cases examined as controls, he could not find the trypanosoma in the cerebrospinal fluid, even though 3 of these were cases of actual trypanosoma fever. He found streptococci also; but he now believes that these were present merely as the result of a secondary infection, and that the trypanosoma is the real cause of the disease. Bruce, who continued Castellani's observations, informed the latter that in 38 further cases he had found the trypanosoma in the cerebrospinal fluid of every case. Somewhat later Castellani⁵ gave a detailed description of the trypanosoma found in this disease. A. Maxwell-Adams⁶ suggested that the disease may be due to

¹ Amer. Jour. Med. Sci., Jan., 1903.

² Lancet, March 14, 1903.

³ Brit. Med. Jour., April 18, 1903.

⁴ Brit. Med. Jour., May 23, 1903.

⁵ Brit. Med. Jour., June 20, 1903.

⁶ Brit. Med. Jour., March 28, 1903.

the trypanosoma; he wrote more especially, however, of the case of trypanosoma-fever reported by Dutton, which he had himself first seen. The later reports of the Commission confirm and amplify Castellani's work in a most interesting manner.

TYPHUS FEVER.—E. Gotschlich¹ has observed in the blood of typhus-fever patients protozoa (apiosoma) that, he thinks, may have something to do with the production of the disease. He describes an endoglobular and two extraglobular varieties. He is guarded in his conclusions concerning the importance of these objects. He thinks, however, that his observations suggest that fleas may transmit these parasites and thus carry the disease, and believes that this hypothesis explains many peculiarities in the transmission of typhus fever.

SEPTIC CONDITIONS.—A very important contribution relating to the diagnosis and prognosis of septic conditions is made by Bertelsmann,² who has investigated a large series of cases. He discusses 154 in particular, in which there was localized pyogenic infection. Forty-eight of these showed bacteria in the circulating blood, but only 20 of the 48 patients died. The author gives a discussion of his results, and reaches the conclusion that it is extremely probable that in a large proportion of cases of what is customarily called local pyogenic infection bacteria reach the circulating blood. There are many points of interest in connection with this; but that of chief practical importance is that if this is true, one should be very guarded in drawing conclusions from positive blood-cultures. Heretofore, positive blood-cultures have been generally accepted as indicating the presence of septicemia of a grave type and as establishing an evil prognosis.

PARASITIC DISEASES

The observations concerning parasites that are of most immediate and evident importance are those that have followed the descriptions of uncinariasis by C. W. Stiles. This author³ gives a summary of his previously published monograph, referring quite extensively to the clinical side of the question. The chief symptoms are anemia, irregular edema, emaciation, general flabbiness and incapacity for work, and gastrointestinal disturbances. Stiles believes that it is the most common disease of the white population in the South, and that in economic importance it at least rivals malaria. He insists upon the extreme importance of prophylaxis. In treatment, he recommends thymol. A

¹ Deut. med. Woch., May 7, 1903.

² Deut. med. Woch., Feb. 5, 1903; Vereins-Beilage, p. 43.

³ Brooklyn Med. Jour., Feb., 1903.

number of other authors have described cases of uncinariasis, the most interesting observations being those of A. J. Smith,¹ who discusses the disease as observed in Texas, and refers to the fact (quoted by Stiles) that in 1893 he observed the first case of American uncinariasis. Smith undertook a systematic examination later and found 8 cases among the students, these young men having come from various parts of Texas.

The most interesting observations to Americans concerning protozoa that have been made for years are those reported 18 months ago by Wilson and Chowning in regard to the spotted fever of the Rocky Mountains. These authors reported a careful study of the disease from the clinical stand-point and from that of etiology, and demonstrated that protozoa are regularly found in patients with this disease, the parasites resembling those of Texas fever. They thought it possible that the disease is carried by ticks. These observations have since been confirmed and amplified by Anderson.² The disease is evidently one of considerable importance, and the demonstration of its nature and of its method of transmission is of evident value from the stand-point of prophylaxis.

DISEASES OF METABOLISM

GLYCOSURIA AND DIABETES MELLITUS.—Under glycosuria may be mentioned pentosuria and levulosuria, because these conditions are of great importance in diagnosis; pentosuria, particularly, is of entirely different significance from glycosuria, but gives a number of similar reactions, especially to copper tests. H. Brat³ describes a case of pure pentosuria. He states that he has found only 5 other such cases on record, but that the condition has probably been repeatedly mistaken for diabetes. That it is an entirely separate condition has been repeatedly demonstrated, and further evidence of this is furnished by the fact that Brat gave 100 grams of glucose to this patient, but this did not produce glycosuria and did not affect the pentosuria. The importance of levulosuria has recently become well recognized. H. Rosin and L. Laband⁴ describe a case of spontaneous levulosuria without glycosuria that had been mistaken for diabetes. The same authors and Schwarz⁵ insist that levulosuria is very common in diabetes, and Schwarz thinks that, when present, it should contraindicate the use of levulose itself, of fruits, and of other substances containing levulose. A. Lion⁶ describes a case in

¹ Amer. Jour. Med. Sci., Nov., 1903.

² Amer. Med., Sept. 19, 1903.

³ Zeit. f. klin. Med., Bd. xlvii.

⁴ Zeit. f. klin. Med., Bd. xlvii, Hefte 1 and 2.

⁵ Deut. Arch. f. klin. Med., Bd. lxxvi.

⁶ Münch. med. Woch., June 30, 1903.

which levulose and dextrose were present coincidentally in such amounts as to give a practically negative result to the polariscopic test. Both forms of sugar afterward disappeared from the urine. Their presence had apparently been the result of acute illness. The latter case is of evident importance, and is further testimony that a single test should not be relied upon.

O. Cohnheim¹ contributes a study that is of great interest in relation to the nature of diabetes. He believes that no one has demonstrated satisfactorily the presence of a glycolytic ferment in the pancreas. Cohnheim believes that he has proved that the juices of pancreas and muscle, acting together, destroy a large amount of sugar. He thinks that a disturbance in this combined action affords an explanation of the nature of diabetes and of the relation of the pancreas to that disease. Rahel Hirsch had similar results, working with a combination of liver and pancreas. Stoklasa and Simacek,² however, described the presence of a glycolytic ferment in practically all tissues examined; and they later³ criticise Cohnheim severely, and state that his results are of no especial value, are due merely to a summation of the effects of pancreas and muscle. The whole question of the importance of a glycolytic ferment is still confused. E. Bendix and A. Bickel⁴ discuss the question at length. They show that oxidative action, and chemical changes in glucose without oxidation, are likely to simulate glycolysis and have not been sufficiently excluded, and that in most instances bacterial action has not been at all satisfactorily excluded. A report that also throws doubt upon the exclusive importance of disturbances of oxidation in producing diabetes is that of H. Lüthje,⁵ who finds that dogs from whom the pancreas has been removed, although they develop diabetes, show a disappearance of their glycosuria if they are starved, in spite of the fact that their blood still contains a large quantity of sugar. Evidently, then, the oxidation of sugar is not by any means entirely interfered with in such animals. O. Loewi⁶ reports some extremely interesting and suggestive experiments of another kind, related to the etiology of diabetes, which make it seem quite possible that sugars normally undergo a colloidal combination when they enter the circulation, and that this combination is necessary to their oxidation. His

¹ Zeit. f. physiol. Chem., Bd. xxxix, Hefte 3 and 4.

² Zent. f. Physiol., Jan., 1903.

³ Zent. f. Physiol., Nov., 1903.

⁴ Zeit. f. klin. Med., Bd. xlviii, Hefte 1 and 2.

⁵ Münch. med. Woch., Sept. 8, 1903.

⁶ Arch. f. exper. Path. u. Pharmak., Bd. xlviii, Hefte 5 and 6.

work suggests that diabetes may be due to a lack of sufficient amount of these combining substances.

Mayer, some time ago, insisted that the presence of a large amount of glycuronic acid in the urine is an indication that diabetes is likely to develop, a statement that, if true, would be of great clinical value. M. Bial¹ presents some interesting evidence that this is not the case. I have presented some observations on the same question and take the same stand as does Bial.

Some of the most important work done in relation to diabetes for a long time past is that on the relation of various forms of fats to the acid intoxication that produces coma. This question has been studied recently by L. Schwarz,² K. Grube,³ and Joslin,⁴ and had been discussed during the previous year by Satta and v. Noorden. These authors all agree that certain fats—particularly those containing many of the lower fatty acids—increase the acid intoxication to a considerable degree, and that this can be controlled to some extent by choosing the proper kinds of fats. Fatty foods of good quality are far less harmful than the cheap varieties, because they contain less of the lower fatty acids. Poor butter is especially to be condemned. Schwarz has found that many of the higher fatty acids also cause some increase in acid intoxication. This author, who writes the most comprehensive paper, recommends that one should give each patient as much fat as he can assimilate, but should carefully watch the excretion of the acetone bodies. He has tried the effect of gluconic acid upon the excretion of acetone bodies and has found that it reduces the excretion somewhat. Caramel was likewise used; but while it did not affect the glycosuria, it was without influence upon the acetone excretion.

DIABETES INSIPIDUS.—E. Pribram⁵ has made careful observations on 10 cases of diabetes insipidus, some of the most important points noted being that syphilis was not present in any case; that no case showed alimentary glycosuria; but that there were, in most instances, evidences of a central nervous disorder. The author inclines to the view that the disease is dependent upon some nervous abnormality. T. W. Talqvist⁶ has made an interesting study of metabolism in diabetes insipidus, and as a result decides that the disease is due to a reduction in the excretory power of the kidneys for solids. They are thus

¹ Zeit. f. klin. Med., Bd. xlvii, Hefte 5 and 6.

² Deut. Arch. f. klin. Med., Bd. lxxvi, Hefte 1-3.

³ Zeit. f. Diätet. u. physikal. Therap., Bd. vi, Heft 2.

⁴ Trans. Assoc. Amer. Physicians, 1903, vol. xviii, p. 260.

⁵ Deut. Arch. f. klin. Med., Bd. lxxvi, Hefte 1-3.

⁶ Zeit. f. klin. Med., Bd. xlix, Hefte 1-4.

obliged to pass the necessary quantity of solids in abnormally large dilution, and hence excrete an abnormal amount of fluid.

GOUT.—K. A. Krause¹ has made a study of the so-called necrotic areas found in gout, and believes that he has determined that these areas do not occur without deposits of urates. He thinks, however, that the presence of urate crystals is often not associated with any change in the tissues, and has indeed great doubt as to whether the areas that have been called necroses are actually such. He believes that they are probably merely granular masses, consisting chiefly of the remnants of substances in which uric-acid crystals have been embedded and enclosed. This is an observation of a good deal of importance against the belief that uric acid produces the symptoms in gout through toxic action on the tissues where it is deposited or is present in concentrated form.

Some important observations concerning the frequency of gout in the United States have been contributed by T. Fletcher,² who thinks that the relative number of cases of gout seen in the Johns Hopkins Hospital was only a little below that seen in St. Bartholomew's Hospital in London. A number of the cases were, in their earlier stages, diagnosed rheumatism. The author particularly insists that gout is much more frequent in this country than it is commonly supposed to be, and that ordinarily it has probably been diagnosed rheumatism.

EXOPTHALMIC GOITER.—An instructive study of the symptomatology of exophthalmic goiter, based upon an experience of 100 cases, is given by G. R. Murray.³ All but 10 of these cases were in women, and the vast majority of them occurred in patients between 15 and 35 years of age. Emotional exciting causes were frequently noted. Usually the first sign observed was enlargement of the thyroid gland. Enlargement was noted in 117 cases; in 3 it was entirely absent. The pulse was always frequent; heart-murmurs were common; exophthalmos was present in 79 cases, but was entirely absent in 32; v. Graefe's symptom was present in only 36 out of 91 cases, while Stellwag's sign was seen in 29; the characteristic tremor was noted in 111 cases; the general peculiar nervousness was observed in 70, and was stated to have been absent in 3. Murray notes one instance of insanity and 2 of hallucinations without insanity; other marked nervous symptoms were quite common. The symptoms were often suddenly much intensified.

ARTHRITIS DEFORMANS.—R. L. Jones⁴ believes that there is a

¹ Zeit. f. klin. Med., Bd. 1, Hefte 1 and 2.

² Jour. Amer. Med. Assoc., Oct. 25, 1902, and Practitioner, Aug., 1903.

³ Lancet, Dec. 12, 1902.

⁴ Lancet, Dec. 27, 1902, and Brit. Med. Jour., May 2, 1903.

definite relation between exophthalmic goiter and rheumatoid arthritis. He reports a series of cases in which the symptoms of the two diseases occurred together. He also insists that in investigating the joints there has been too large an exclusion of study of the other tissues. He contributes an extensive series of observations of the reflexes, which leads him to the view that there is segmental disease of the spinal cord in rheumatoid arthritis. The reflexes are usually increased in the diseased limbs. The author believes that when this irritability of the reflexes is seen to be decreasing, this fact is of a decidedly satisfactory prognostic import; but that if apparent improvement is occurring and the reflexes do not show diminished irritability, the prognosis is much more questionable. D. L. Edsall and R. S. Lavenson¹ discuss the relation of tuberculosis to chronic polyarthritis. They describe a case of Still's type of chronic polyarthritis in a child, in which there were violent general reactions to tuberculin, and the joints showed severe local reaction also. The enlarged glands present were shown to contain large numbers of tubercle bacilli. The authors believe that this case was probably a peculiar variety of chronic tubercular polyarthritis. From the local and the general reactions observed in a number of the other cases, they think that tuberculosis may prove to be a not uncommon cause of chronic polyarthritis.

MYOPATHIC SPINAL RIGIDITY.—E. Barg² reports a number of cases that are of the class described by Senator under this term. He considers them extremely important to recognize, because in the early stages they are due merely to muscular rigidity and have a far better prognosis than have those cases in which there is change in the bones and the ligaments. The diagnosis is made chiefly by finding the absence of involvement of the nerve roots, the lack of any evidence of disease of the bones in x-ray pictures, and by determining that passive movements can be carried out normally under anesthesia. Cases of this sort and of spondylitis are likely to be incorrectly interpreted in their earlier stages. While uncommon, they are very important.

ACROMEGALY.—D. L. Edsall and C. W. Miller³ report some investigations of metabolism in acromegaly. The most striking points noted were very great retention of nitrogenous substances, with a much less pronounced retention of phosphorus and calcium, and an abnormal excretion of calcium through the urine. The authors emphasize the

¹ Amer. Jour. Med. Sci., Dec., 1903.

² Zeit. f. klin. Med., Bd. 1, Hefte 3 and 4.

³ Univ. Penna. Med. Bull., June, 1903.

fact that there is evidence that the bone formed in acromegaly is abnormal, and that the abnormalities in the bones are probably the result of metabolic disturbances, rather than of mere distorted overgrowth.

DISEASES OF THE BLOOD

A. Dare¹ describes a method of determining the alkalinity of the blood, using oxyhemoglobin as the indicator, titrating with tartaric acid, and determining the disappearance of the characteristic spectroscopic absorption band. The accuracy of this method still needs some investigation, but the idea is most ingenious. The alkalinity of the blood, when determined by the present methods, is, however, of questionable clinical importance. A most suggestive article concerning the etiology of obscure anemias is that of F. Freymuth,² who injected rabbits with nonlethal doses of living typhoid bacilli, using very minute amounts. He produced no clinical evidence of typhoidal infection, but found decided changes in the blood-building organs, particularly in the bone-marrow, and decides that even when the clinical signs of infection are absent, very small doses of bacteria may produce marked changes in the blood-building apparatus. The demand upon this apparatus may be so great that it cannot be met, in which case anemia is the result. The author insists upon the importance of looking for a source of very slight infection in obscure anemias.

J. N. Hall³ reports 2 cases of chronic cyanosis with polycythemia, one of the patients having enlargement of the spleen. W. Osler⁴ describes 4 cases, 2 of which were under his own care, and gives a general discussion of the condition. Its most striking symptoms are cyanosis and an increase in the number of erythrocytes. The latter may reach 12,000,000, while the hemoglobin may go as high as 165 per cent. The spleen is usually enlarged. The author considers the condition a distinct clinical entity, which is separate from the previously recognized causes of cyanosis. Its nature is obscure.

A case in which blood-examinations led to the establishment of a difficult diagnosis is reported by A. Stengel and C. Y. White.⁵ It occurred in a woman of 25, who had some remarkable attacks of excessive cyanosis without signs of severe circulatory failure. The red cells showed such remarkable abnormalities in shape, and there were so many nucleated red cells present, that a drug habit was suspected,

¹ Phila. Med. Jour., Jan. 17, 1903.

² Deut. med. Woch., May 14, 1903.

³ Amer. Med., June 27, 1903.

⁴ Amer. Jour. Med. Sci., Aug., 1903.

⁵ Univ. Penna. Med. Bull., Feb., 1903.

this suspicion being emphasized by the presence of hemoglobinuria during the attacks. It was ultimately found that the patient was secretly taking large doses of acetanilid.

The question of the importance of cytodiagnosis in establishing the nature of pleural and peritoneal effusions has been extensively investigated by L. v. Ketly and A. v. Torday,¹ who conclude that, as a rule, mononuclear cells predominate in primary tubercular pleurisies. Secondary acute tubercular pleurisies show varying conditions, but leukocytes usually soon predominate. In chronic tubercular pleurisy the conditions are the same as in Bright's disease and in cardiac disease; that is, there are many endothelial cells. A fluid can properly be called a transudate only when there are a large number of endothelial cells present. The conditions in peritoneal fluids are less characteristic than in pleurisy, though they resemble those in the latter condition. The authors think that cytodiagnosis is of importance in the earlier stages of effusions in establishing a diagnosis. The degree of its importance is, however, still doubtful.

Strauss and Rohnstein consider that a high count of polymorphonuclear leukocytes distinguishes carcinoma from pernicious anemia. Kurpjuweit² does not agree with this view, finding the polymorphonuclear count in carcinoma to be often too low to be at all distinctive. Others have made the same observation.

The iodine reaction of the leukocytes has been rather extensively studied of late. Locke has recently stated that it is particularly important in the diagnosis of septic conditions. S. Kaminer³ believes, however, that he has demonstrated experimentally that it occurs in many conditions, the essentials for its occurrence being only the presence of fever, leukocytosis, and bacterial infection. Many bacterial toxins besides those of the pus-producing organisms give rise to the reaction. It does not usually occur in typhoid fever, but the author believes that it may occur in this disease even when no complications are present.

CHLOROSIS.—F. Erben⁴ has made an elaborate study of the chemical condition of chlorotic blood, reaching the conclusion that his observations indicate the incorrectness of the theory that chlorosis is due to an abnormal destruction of blood.

PERNICIOUS ANEMIA.—Some elaborate, painstaking, and prolonged investigations, which are of marked interest in relation to pernicious

¹ Deut. Arch. f. klin. Med., Bd. lxxvii, Hefte 1 and 2.

² Deut. med. Woch., May 21, 1903.

³ Zeit. f. klin. Med., Bd. xlvii, Hefte 5 and 6.

⁴ Zeit. f. klin. Med., Bd. xlvii, Hefte 3 and 4.

anemia, are those of Rosenqvist,¹ who studied a large number of cases of severe bothriocephalus anemia and also cases of cryptogenic pernicious anemia. In both classes of cases he found, in metabolism-experiments, a decided tissue-destruction. In the bothriocephalus cases this was replaced by a nitrogen-retention after the patients had got rid of the worms. The author believes that his work definitely indicates that pernicious anemia is a toxic condition. The etiology of pernicious anemia has again been discussed by W. Hunter,² who insists that so-called Biermer's anemia includes a heterogenous group, while true pernicious anemia includes a much smaller group of cases of a peculiar and special nature. His observations upon the amounts of iron in various organs indicate, to his mind, that in pernicious anemia there is a peculiarly marked degree of hemolysis. He believes that the disease is a septic condition, and that the infection usually takes place through the tongue. A study of the urine, the feces, the metabolic conditions, etc., in pernicious anemia, in an attempt to demonstrate some evidence of toxemia, is reported by E. Bloch.³ He has, however, been unable to find anything to lead him to decide that a definite toxemia is present, and, particularly, he has found no evidence of gastrointestinal intoxication. He believes that the disease is set in motion by various causes, and that it really consists in the production of blood-cells that are abnormally easily destroyed. The changes in the central nervous system that occur in pernicious anemia have been studied in 41 cases by F. Billings,⁴ who discusses the various symptoms that occur, and inclines strongly to the view that the changes are due to a toxin that may tend to produce either marked blood changes or marked changes in the tissues of the nervous system and elsewhere. In some cases it may cause both kinds of changes.

LEUKANEMIA.—The condition to which Leube gives this name includes those cases, only infrequently observed, in which there are blood-changes that are partly those of pernicious anemia and partly those of mixed leukemia. This condition has been discussed by H. Luce,⁵ who describes a case, reviews the literature of the subject, and reaches the conclusion that these cases present no distinct clinical picture, and that the condition does not deserve a special name. He believes that it is a leukemic change in which there has been especial stimulation of the erythroblastic tissues.

¹ *Zeit. f. klin. Med.*, Bd. xlix, Hefte 1-4.

² *Lancet*, Feb. 7, 1903.

³ *Deut. Arch. f. klin. Med.*, Bd. lxxvii, Hefte 3 and 4.

⁴ *Chicago Med. Recorder*, Jan., 1903.

⁵ *Deut. Arch. f. klin. Med.*, Bd. lxxvii, Hefte 3 and 4.

LEUKEMIA.—A report of decided clinical importance is that of F. Billings and J. A. Capps,¹ who describe a case of acute myelogenic leukemia and discuss the cases to be found in literature. They believe the cases that are authentic to be 8 in number. Acute leukemia is usually distinguished by the presence of a great number of large mono-nuclear cells. The myelogenous group of cases are important because of the very different, though extremely striking, blood-picture. It may be difficult to distinguish this group from acute infections, acute exacerbations of chronic leukemia, some cases of pernicious anemia, and new growths involving the bone-marrow. Differential counts of the white cells constitute the only means of distinguishing the conditions, the very large number of myelocytes being the important point.

DISEASES OF THE CARDIOVASCULAR SYSTEM

BLOOD-PRESSURE.—Clinical investigations of the blood-pressure are constantly receiving more attention and have now become a part of careful examinations. W. B. Stanton² has devised a modification of the Riva-Rocci instrument, which he describes in detail. I can state from experience that this is, for clinical purposes, the most satisfactory instrument on the market. An investigation of the blood-pressure in nephritis leads Buttermann³ to state that it is increased in the active stage of acute nephritis, practically unchanged in amyloid kidney, and varies in chronic parenchymatous nephritis, chiefly in consonance with the condition of the heart. It is very important in the latter respect, a low blood-pressure indicating cardiac insufficiency. Venesection causes an evident decrease in blood-pressure,—a point of importance in therapeutics. A determination of the blood-pressure after exercise in cardiac cases the author believes to be of extreme value in determining whether exercise has a good or bad effect, and also in determining the immediate condition of the heart. If the heart is incompetent, exercise causes the pressure to fall. Similar conditions have been observed by O. Moritz,⁴ who finds that with a weak myocardium there is, at first, an increase in the blood-pressure, but that the pressure rapidly falls, even while the exercise is being continued. If exercise causes only very slight increase followed by rapid fall in the pressure, this indicates severe cardiac incapacity; and if it afterward falls below normal, it indicates cardiac exhaustion. Somewhat contrary

¹ Amer. Jour. Med. Sci., Sept., 1903.

² Univ. Penna. Med. Bull., Feb., 1903.

³ Deut. Arch. f. klin. Med., Bd. lxxiv, Hefte 1 and 2.

⁴ Deut. Arch. f. klin. Med., Bd. lxxvii, Hefte 3 and 4.

results have been obtained by Karrenstein,¹ who finds that exercise does not increase the blood-pressure in normal persons.

DISEASES OF THE HEART.—The importance of syphilis in producing cardiac disease has recently been insisted upon by several authors, particularly by J. W. Runeberg,² who believes that syphilis will soon come to be considered as important in relation to the heart and the vessels as it is already thought to be in relation to disease of the central nervous system. He thinks that anginoid symptoms and the signs of fibroid change in the heart should usually be attributed to syphilis, when other causes have been reasonably excluded and the patient is less than 50 years of age,—a view that is certainly extreme, unless a large proportion of the cases can be “reasonably excluded.” His observations are chiefly clinical, with no post-mortem evidence. The same is true of those of Schuster,³ who thinks syphilis of the heart is frequent and refers to 3 cases of aortic insufficiency observed in 22 persons with tabes dorsalis. He believes that both the tabes and the aortic insufficiency were due to syphilis.

The question of an asynchronous contraction of the two ventricles (hemisystole) has been discussed by E. v. Leyden,⁴ H. E. Hering,⁵ and F. Riegel.⁶ Von Leyden maintains his previous view that such a condition does occur, and describes cases in which clinical observation apparently indicated that the two ventricles were contracting asynchronously. Hering and Riegel insist that experiment demonstrates that it is impossible for hemisystole to occur, except in the dying heart. The condition described by v. Leyden, Hering calls pseudo-hemisystole. It is due to a lack of the same rhythm in contraction in the auricles and ventricles, but not in the two ventricles. Hering's view is assented to by Riegel, who attributes the condition to extra-systole. Extra-systole and other disturbances of cardiac rhythm have been written of by E. Rehfisch,⁷ who emphasizes the importance of distinguishing the characteristics of the different varieties of arrhythmia because of their marked bearing upon prognosis. Extra-systole is one of the most common forms. It is very important, because in a large number of instances the prognosis is extremely satisfactory, although its importance in each case must be determined by careful investigation of the individual. It is characterized by the occurrence of a systole at an

¹ Zeit. f. klin. Med., Bd. 1, Hefte 3 and 4.

² Deut. med. Woch., Jan. 1 and 8, 1903.

³ Deut. med. Woch., Oct. 8, 1903.

⁴ Deut. med. Woch., May 21, 1903.

⁵ Deut. med. Woch., No. 22, 1903.

⁶ Deut. med. Woch., Oct. 29, 1903.

⁷ Deut. med. Woch., May 14 and 21, 1903.

unduly early period, the next systole occurring after an unduly prolonged period. The long and the short period together equal the duration of two normal periods. Other conditions that Rehfisch discusses are the arrhythmia due to "blocking" of the heart-contraction at the auriculoventricular junction; arrhythmia with extremely irregular forms of intermission; *pulsus myurus*, in which the contractions follow at constantly shorter intervals, until a minimum is reached and the cycle is begun again; and *pulsus alternans*, in which there is a high wave followed by a low one. *Pulsus alterans* always indicates a weak heart and a serious prognosis.

A condition of interest in this connection is the Adams-Stokes syndrome, which has been discussed by H. Luce,¹ B. Lewy,² and W. Osler. Luce thinks that the condition probably arises in disorder of the heart-muscle itself. Osler gives a general discussion of this condition and of slow pulse in general. The varieties of Adams-Stokes disease that he distinguishes are postfebrile, neurotic, and arteriosclerotic. The postfebrile cases are likely to occur at any period of life; they are more favorable than are those of the other groups, but even they are very dangerous. Most of the cases are found in the arteriosclerotic group. These cases usually show arteriosclerosis, cardiac enlargement is generally absent, murmurs are frequently heard, but valvular disease is ordinarily absent at postmortem. Clinically, the most striking symptoms are the slow pulse and peculiar paroxysmal attacks, the latter consisting of vertigo, syncope, pseudo-apoplexy, epileptiform seizures, asthmatic attacks, angina sine dolore, acute edema of the lungs, etc. The ending is commonly in sudden death. The pathology is obscure, and treatment is extremely unsatisfactory.

PERICARDITIS.—An interesting and elaborate study of chronic obliterative pericarditis with ascites has been contributed by A. O. J. Kelly.³ He notes that in these cases the liver may present a variety of lesions. The only feature common to all these cases is wide-spread disease of serous membranes. Many of the cases are probably tuberculous; but the pericarditis may also develop from chronic nephritis, from cholelithiasis with localized peritonitis, and probably from many other causes. The intensity of the lesions about the liver the author thinks to be due to a force that carries fluids and foreign particles toward the central tendon of the diaphragm. He does not think it necessary to believe that the liver itself is originally concerned in producing the condition. The diagnosis is greatly helped by a previous

¹ Deut. Arch. f. klin. Med., Bd. lxxiv, Hefte 3 and 4.

² Zeit. f. klin. Med., Bd. xlvii, Hefte 3 and 4.

³ Amer. Jour. Med. Sci., Jan., 1903.

history of acute pericarditis, pleurisy, or perihepatitis; it depends also upon the early occurrence and subsequent disappearance of edema of the legs; the later appearance of marked ascites, with little or no general edema; enlargement of the liver in the early stages, this organ becoming small and hard later. The spleen is not usually markedly enlarged. Perihepatitis is common. Ascites reappears rapidly after tapping, and there are usually some physical signs of adherent pericardium. The influence of trauma in producing pericarditis, endocarditis, and myocarditis has been discussed by J. H. Pleasants,¹ who describes 2 cases of traumatic pericarditis and collects 4 others. He also thinks that trauma may produce acute or slowly progressing endocarditis, and finds 14 such cases in literature. Traumatic myocarditis, also, he believes, must be considered to occur occasionally; and 4 such cases are discussed. A paper of interest in relation to the diagnosis of pericarditis is that of F. Riegel² on paradoxical pulse. The author opposes the far too generally accepted idea that paradoxical pulse is a direct indication of the presence of pericarditis. He insists that paradoxical pulse is due not only to this cause, but also to disorders of inspiration producing negative inspiratory pressure, and likewise to weak heart. It may often be observed during convalescence from acute diseases and also in chronic cardiac weakness.

Some cases of acute, fatal endocarditis that exhibited a course with little or no fever are reported by G. Fazio³ and H. M. Fisher.⁴ W. v. Leube⁵ contributes a series of observations concerning the occurrence of albuminuria in uncomplicated aortic regurgitation in which cardiac incompetency was absent. One case of this kind is reported, and others are referred to. The urine contained a small amount of albumin and a few hyaline and granular casts. The author considers the cause to be the constant hammering against the arteries, the marked variations in the blood-pressure producing anatomic changes in the kidney. Interesting observations of the occurrence of congenital cardiac disease in a number of members of the same family are described by De la Camp,⁶ who reports 6 cases in one family in which there were evidences of a congenital cardiac lesion. The only point of importance in the family history was alcoholism in the father, though syphilis could justly be suspected. In another instance in which 2 cases of congenital

¹ Johns Hopkins Hosp. Bull., May, 1903.

² Deut. med. Woch., May 14, 1903.

³ Gazz. deg. osped., Mar. 8, 1903.

⁴ Phila. Med. Jour., May 30, 1903.

⁵ Münch. med. Woch., July 28, 1903.

⁶ Berl. klin. Woch., Jan. 19, 1903.

cardiac disease occurred in the same family, there was a family history of syphilis.

Observations of marked importance in relation to the diagnosis of aneurism of the aorta are discussed by J. Sailer and G. E. Pfahler¹ under the title of tortuosity of the aorta. In a series of patients that presented some of the symptoms of aneurism of the aorta, and also some physical signs, such as inequality of the radial pulses, slight tracheal tug, accentuation of the second aortic sound, systolic murmur, and suprasternal pulsation, x-ray examination showed an enlarged shadow at the level of the fifth or the sixth dorsal vertebra, extending $1\frac{1}{2}$ to 2 inches to the left. Some of these cases could be examined at post-mortem, and it could be determined that aneurism was absent; but the aorta was bent at this point in a manner resembling the tortuosity observed in the peripheral vessels in arteriosclerosis. The interest of these observations in relation to aortic aneurism is evident in connection with the reliance that has been placed upon x-ray examination in recent years.

DISEASES OF THE RESPIRATORY SYSTEM

J. Pal² and P. K. Pel³ have described interesting cases in which a murmur occurred in the apex of one lung in persons with tuberculosis of the lungs. The murmurs in the two instances were similar. Pal's case is the more interesting, the patient presenting a continuous murmur above the spine of the scapula. For various reasons, the author made a diagnosis of tubercular infiltration of the lymph-glands, with compression or traction upon the azygos vein at about the point at which it empties into the cava. Post-mortem examination confirmed this diagnosis.

A subject of a good deal of importance is the simulation of abdominal conditions—particularly appendicitis—by acute thoracic disease. Cases of this sort are described by P. Hampeln.⁴ In this series of cases, which were instances of pleurisy and of pneumonia, the symptoms at the outset were those of acute, violent peritonitis, or of intestinal occlusion; while the thoracic symptoms and signs developed but slowly. Cases of this variety are of great importance, because they have repeatedly led to abdominal operations.

A source of persistent cough that is interesting on account of the

¹ Amer. Jour. Med. Sci., Oct., 1903.

² Zent. f. inn. Med., July 11, 1903.

³ Berl. klin. Woch., April 13, 1903.

⁴ Zeit. f. klin. Med., Bd. xlv, Hefte 5 and 6.

fact that it demonstrates the necessity of carefully investigating individual cases is described by G. Rosenfeld.¹ This patient had an uncontrollable cough, which ultimately proved to be due to irritation produced by granules and fine pieces of feather that came from a pet parrot. The cough came on whenever the woman took care of the bird, and stopped when she ceased to do so. An extremely striking case, in which casts of the bronchi, consisting of blood-clots, were repeatedly coughed up during the course of attacks of violent dyspnea, is described by E. Fabian.² The primary condition in the case was chronic icterus with hemorrhagic tendency. This led to hemorrhage into the bronchi. The patient died in an attack. Very few similar cases have been described. The etiology of emphysema of the lungs has been discussed by N. Golubow,³ who especially refers to some conditions not commonly considered to be causes of emphysema,—i.e., dilatation of the aorta and abnormalities in the shape of the ribs. He describes cases illustrating his views, and particularly insists that the violent cough often produced by aortic dilatation, or other effects of such dilatation, even when cough is absent, may result in emphysema. The occurrence of pulmonary emphysema without other evident cause should suggest the possible presence of aortic dilatation. The abnormality in the ribs to which the author refers is a union of the costal cartilages below the third or the fourth, at a point some distance from the sternum.

The diagnosis of infarct of the lung has been investigated from a clinical and a pathologic stand-point by E. Tiedemann.⁴ He decides that localized dulness, often with a coincident tympanitic note, is the most common sign. Râles and bronchial breathing are not produced in the infarct itself, but around it; they are, however, often present, as is a pleural friction. The situation is important, the right lower lobe being most commonly involved; next, the right upper lobe; then the left lower; and lastly, the left upper. The right middle lobe is least frequently involved. Syphilis of the lung simulating pulmonary tuberculosis has, in recent years, received considerable attention, and has lately been discussed by A. Stengel,⁵ who reviews the literature of the subject and reports the post-mortem conditions in a case. He believes that no more positive statement can at present be made than that when there is a definite history of infection and other syphilitic lesions are found, the evidences of pulmonary disease should be thought

¹ Berl. klin. Woch., Mar. 22, 1903.

² Deut. Arch. f. klin. Med., Bd. lxxvii, Hefte 1 and 2.

³ Deut. med. Woch., Oct. 1 and 8, 1903.

⁴ Zeit. f. klin. Med., Bd. l, Hefte 1 and 2.

⁵ Univ. Penna. Med. Bull., May, 1903.

of as indications of possible syphilitic disease of the lung, particularly if tubercle bacilli are persistently absent. Emaciation is usually less pronounced than in tuberculosis, and there is more tendency to stenosis of the trachea or of the main bronchi.

DISEASES OF THE GASTRO-INTESTINAL TRACT

An interesting epidemic of ulcerative stomatitis that occurred among the Boer troops during the South African War is discussed by J. C. J. Bierens de Haan.¹ The disease was contagious, and the opportunity for infection was freely provided through the Boer custom of eating from one general dish of food. The main predisposing cause was apparently a lack of salt; for as soon as a proper supply of this had been obtained the disease began to disappear.

H. Elsner² has described 2 cases that are of interest in relation to the diagnosis between gastric and esophageal disease. The first patient presented the signs of stenosis of the pylorus, but also retained a large amount of fluid in the esophagus, and experienced difficulty in swallowing. The esophageal symptoms proved to be due to spasm. The other patient had the characteristic signs of a diverticulum high up in the esophagus; and, later, showed a hard mass in the pyloric region, with enlargement of the inguinal glands. At postmortem the tumor proved to be the gall-bladder filled with gall-stones. Had it not been for the mistaken diagnosis of gastric carcinoma in this case, the esophageal diverticulum might have been successfully operated upon, and the patient's life could thus have been saved. The importance of infusoria in producing gastric and intestinal symptoms has been repeatedly discussed during the past few years. This subject is somewhat extensively referred to by P. Cohnheim,³ who describes a considerable series of personal observations and discusses the cases found in literature. The chief conclusion reached by him is that the presence of infusoria in the esophagus or in the stomach is a strong indication that there is carcinoma of either the esophagus or the stomach, without stenosis. He thinks that the presence of infusoria may be one of the earliest and most certain signs of carcinoma. Flagellata and ciliata have no pathogenetic importance to his mind, and he thinks it irrational to employ substances intended to kill them. They are more likely to be present when there is disturbed digestion, but they do not produce the disturbance. Very curious cases are occasionally met with, in which patients

¹ Deut. med. Woch., Feb. 12, 1903.

² Deut. med. Woch., No. 24, 1903.

³ Deut. med. Woch., Mar. 19 and 26, and Apr. 2, 1903.

believe that living animals are present in their stomach. These sensations are sometimes referable purely to actual mental disease, but sometimes they are not. In the latter class of cases, A. Stengel¹ believes that there is some anatomic peculiarity that explains these sensations. He describes a case in which polypoid projections from the mucosa were found at postmortem. These might readily have produced the sensation of living and moving things. These patients should not be considered to be simply the subjects of delusions, but a careful attempt should be made to discover some actual cause for their symptoms. A series of cases in which some gastric trouble was at first believed to be present, but in which spinal disease was ultimately discovered, is described by F. Treves.² Operation was considered in these cases, because of the severe gastric symptoms,—chiefly pain. In one case Potts's disease was discovered, and in another it was ultimately found that there was a sarcoma growing from the mid-dorsal region of the spine. The author believes that when pain is the predominating symptom in apparent gastric disease, one should suspect error in the diagnosis.

The condition described by Einhorn as a separate entity under the name of hemorrhagic erosion of the stomach has been discussed by H. Elsner,³ who investigated 120 cases as to the presence of fragments of mucous membrane in the stomach-contents. He thinks that such fragments always indicate a pathologic state. They were, however, found in various conditions, and there were often no symptoms referable to them; and the author believes that they do not indicate the presence of any special disease. Such fragments are, however, of prognostic value, as their disappearance is an excellent sign and their persistence indicates the persistence of trouble. Elsner finds that when they are present lavage with a solution of silver nitrate is valuable. An extensive report of an unusually interesting case of gastric dilatation with tetany has been contributed by W. E. C. Dickson.⁴ The patient, a man of 47 years, had extremely grave and prolonged tetany, but finally recovered. During the attacks there was spasmodic contraction of the vessel-walls. There was also leukocytosis. The man became temporarily blind. The satisfactory result of the case was attributed to persistent lavage of the stomach, thus emptying it of its putrefying contents. Saline hypodermoclysis seemed also to be very useful. An interesting diagnosis of hour-glass contraction of the stomach, confirmed at post-mortem examination, is reported by F. Rosenfeld.⁵ The

¹ Univ. Penna. Med. Bull., May, 1903.

² Practitioner, Jan., 1903.

³ Deut. med. Woch., Oct. 8, 1903.

⁴ Practitioner, Jan., 1903.

⁵ Zent. f. inn. Med., Feb. 14, 1903.

diagnosis was based upon the fact that a stomach-tube containing a metal spiral was introduced and observed with the fluoroscope, and it was found that there was a bright cavity below the lower end of the tube, and that in the bottom of this cavity there was a mass of fluid. This led to the conclusion that that organ was divided into two cavities. Some new methods for diagnosing carcinoma of the stomach have been described. A. Gluzinski,¹ in cases resembling ulcer, examines the contents of the stomach 3 times on the same day; after fasting, after a test-meal of egg-albumin, and after a test-dinner. If, after any of these tests, free hydrochloric acid is absent, this speaks in favor of carcinoma. Cases are reported in which a very early diagnosis was made by this method, though the author does not think that the outlook from operation in cases of carcinoma of the stomach is encouraging. H. Salomon² thinks that the demonstration of a considerable amount of serum-albumin in the stomach-contents is indicative of carcinoma, and describes his method of carrying out this test. He admits that similar conditions may be produced in other disorders than carcinoma, but considers that if the test is negative, it is important.

P. Koch³ has had the unusual experience of observing two cases of gastrocolic fistula within a short time, the diagnosis having been made during life. He gives an interesting review of the literature and of the diagnosis of the condition. It is likely to be mistaken for intestinal occlusion or for acute peritonitis, on account of the feculent vomiting, and sometimes for hysteria. The most important symptoms are feculent vomiting, lenteric diarrhea, identical appearance of the vomit and the stool, and the passage directly into the stomach of air insufflated into the bowel, these symptoms usually occurring in cases of gastric carcinoma, and sometimes in gastric ulcer. D. L. Edsall and C. A. Fife⁴ describe a case in which the symptoms were strikingly like those of gastrocolic fistula, but in which post-mortem examination showed that the feculent vomiting and the other symptoms had been due to pyloric carcinoma with a rigid, permanently patulous pylorus. They attribute the feculent vomiting to reversed peristalsis through this persistently patulous opening. This patient vomited material containing over 4 per cent. of fat, and the only possible source of this fat seemed to be the rectal enemas. G. Kelling⁵ describes a case of gastrocolic fistula in a man only 27 years of age. A remarkable observation made was

¹ Mittheil. a. d. Grenzgeb. d. Med. u. d. Chir., Bd. x, Hefte 1 and 2.

² Deut. med. Woch., July 30, 1903.

³ Arch. f. Verdauungskr., Bd. ix, Heft 1.

⁴ Am. Med.

⁵ Arch. f. Verdauungskr., Bd. ix, Heft 1.

that after this fistula had been successfully operated upon, two spontaneous gastro-enterostomies, due to carcinomatous ulceration, established themselves. They were of course discovered only at post-mortem.

In examining the feces, particularly for calculi, P. Grutzner¹ states that many difficulties may be overcome by using brandy, instead of water, to suspend the feces. He has also had much satisfaction from breaking up the feces by means of a spiral egg-beater, the spiral being of conical form and being pressed up and down in using. He discusses the details of the use of this method, which, he believes, greatly aids clinical observations. O. Loewi² believes that he has determined that nutritive rectal enemas produce antiperistaltic movements, and that the enemas are carried into the small intestine, and even into the stomach and the esophagus in appreciable quantities. He insists that there may be danger in using nutritive enemas in diseases of the lower part of the small intestine, such as typhoid fever, or in appendicitis, because of the violent peristaltic movements that they may set up. In diseases of the stomach and of the upper part of the small intestine this danger is rarely present. H. D. Rolleston and A. J. Jex-Blake³ remark upon the frequent occurrence of vomiting in cases that they have fed with nutritive enemas. They believe that in many cases this was due to oral sepsis from decayed teeth, and in others was probably a reflex result of the injections. D. L. Edsall and C. W. Miller,⁴ P. Deucher,⁵ and R. Ehrstrom⁶ discuss the influence of rectal enemas upon nutrition and the extent to which they are absorbed. Ehrstrom finds that certain enemas are well absorbed, his conclusions differing from those of the other investigators mentioned, who find that it is impossible by this method to maintain the nutritive balance of the organism, and the patient is usually being more or less starved. Decomposition-processes in the intestine are also usually excessive when nutritive enemas are being used.

The question of spastic obstipation has received attention from a number of authors. A. Bum⁷ reports a case in which this condition was associated with spasm of the abdominal and other muscles. The condition is discussed at length by G. Singer,⁸ who describes the symptoms

¹ Deut. med. Woch., Oct. 29, 1903.

² Zeit. f. klin. Med., Bd. 1, Hefte 3 and 4.

³ Brit. Med. Jour., July 11, 1903.

⁴ Univ. Penna. Med. Bull., Jan., 1903.

⁵ Korresp.-Bl. f. Schweiz. Aerzte, No. 2, 1903.

⁶ Zeit. f. klin. Med., Bd. xlix, Hefte 1-4.

⁷ Zent. f. inn. Med., Jan. 3, 1903, p. 29.

⁸ Berl. klin. Woch., 1903.

associated with it, which are chiefly dyspeptic symptoms and abdominal pain, with difficulty in defecation. Rectal examination shows rigid contraction of the external sphincter. The feces are usually narrow, pencil-like masses. The author recommends using rectal bougies, and insists that purgatives should be employed only with extreme care.

A large series of cases of dysentery occurring in Moscow were investigated by Rosenthal,¹ who finds that they are due to the bacillus of Shiga. He describes a case of general septicemia due to the dysentery bacillus. The relation between influenza and appendicitis has in recent years been discussed with a good deal of interest. Schultes² has made a series of careful observations of soldiers in relation to this point, and has reached the conclusion that the number of cases of appendicitis that can be referred to the influence of influenza is very small. The catarrhal changes set up by influenza may sometimes cause appendicitis, but the author does not think that there is any evidence that influenza is an important cause of appendicitis. A rather remarkable complication of appendicitis is described by Middeldorpf,³ the man having an embolism of the right femoral artery, which caused gangrene. Amputation of the leg became necessary. The clinical course of tuberculosis of the peritoneum was exhibited by a case of appendicitis described by H. Rubritius,⁴ the patient having shown fluid in the abdominal cavity, diarrhea, and vomiting for six weeks. At autopsy there was found a seropurulent peritonitis with a perforated appendix. Similar cases are referred to; and in a note to the article v. Jaksch makes the rather sweeping recommendation that in all cases that look like tuberculosis of the peritoneum operation should be carried out, because it is likely to do good, even in tuberculosis, and may be the direct means of saving life in conditions such as that in the case reported.

Two cases of multiple stenosis of the intestine are described by H. Schlesinger,⁵ who discusses the diagnosis of the condition. If multiple tumors are found, with symptoms of stenosis, the diagnosis is comparatively simple; otherwise it depends chiefly upon the observation of "stiffening" of the intestine in different regions of the bowel, but always in approximately the same location, together with the occurrence of loud gurgling sounds and a history of tuberculosis or syphilis.

¹ Deut. med. Woch., Feb. 5, 1903.

² Deut. med. Woch., Oct. 15, 1903.

³ Deut. med. Woch., July 30, 1903.

⁴ Mitth. a. d. Grenzgeb. d. Med. u. d. Chir., Bd. x, Hefte 1 and 2.

⁵ Zent. f. inn. Med., Jan. 10, 1903.

DISEASES OF THE LIVER

* A very convenient clinical method for determining the presence of urobilin in the urine has been described by W. Schlesinger.¹ It consists in mixing equal parts of urine and of a 10 per cent. solution of zinc acetate in absolute alcohol. This is filtered, and the filtrate at once shows a striking green fluorescence and the characteristic absorption-band in the spectrum. I have used this test with much satisfaction; it greatly simplifies the determination that urobilin is present and is often very useful. A modification of Huppert's test for bile has been described by M. Nashayama.² One mixes 5 c.c. each of acid urine and of 10 per cent. barium chlorid, centrifugates, decants the supernatant fluid, and treats the precipitate with 2 c.c. of a reagent consisting of 99 parts of 95 per cent. alcohol and one part of fuming HCl, each liter of this fluid containing also 4 grams of ferric chlorid. The presence of bile causes a brilliant green or bluish-green color. The subsequent addition of nitric acid containing nitrous acid causes the color to become violet or red.

The nature of the intoxication that occurs in liver-disease has been studied by L. Pflughoeft,³ who has particularly investigated the question whether cholemia is due to an increase in the molecular concentration of the blood. He decides that it positively is not due to this cause, and thinks that his work supports the position of Bickel and others, who believe cholemia to be due to a specific form of poisoning. The cause of the slowing of the pulse in icterus has been studied by K. Brandenburg,⁴ who believes that he has demonstrated that irritation of the vagus is one of the important elements, the irritation being reflex and being produced by direct irritation of the nerves of the heart. The presence of bile in the blood probably also causes damage to the heart-muscle.

An observation of considerable importance, if it had proved to be correct, was made two years ago by H. Strauss, who thought that he had demonstrated that alimentary levulosuria indicates with considerable probability the presence of disease of the liver. This is not assented to by G. Landsberg,⁵ who describes a series of observations indicating that the test is not a satisfactory one. I have studied the question in a number of cases and have reached results like those of Landsberg.

¹ Deut. med. Woch., Aug. 6, 1903.

² Zeit. f. physiol. Chem., Bd. xxxvi, p. 398.

³ Deut. med. Woch., May 14, 1903.

⁴ Berl. klin. Woch., Sept. 21, 1903.

⁵ Deut. med. Woch., Aug. 6, 1903.

An interesting discussion of the condition that he terms *acholia* is given by W. B. Cheadle,¹ this name being used to indicate the apparent absence of bile in the stools without the presence of jaundice or other signs of biliary obstruction. This condition is particularly common in children; in adults it is not infrequent in those with a gouty tendency. It is often temporary, but sometimes persistent, and in children it is likely to cause considerable disturbance of health. The author believes it to be due to some defect in the transformation of bile-pigments into urobilin, and thinks that the functions of both the liver and the pancreas are interfered with; but the pathologic conditions in the disorder are obscure. The chief point in the treatment, in his opinion, is to be very careful about the diet,—particularly to predigest the fats and the starches, or to limit the fats to a very low point.

In discussing cirrhosis of the liver, W. H. White² insists that there are a number of important misconceptions prevailing in regard to disease of the liver. He believes that true cirrhosis occurs only as the result of alcoholism, and does not admit that malaria and other conditions may cause this disease, even though producing biliary obstruction. He thinks that no distinction should be drawn between the atrophic and the hypertrophic form, these being but two stages of the same condition. The only exception is true Hanot's cirrhosis, which is a rare disease. The author emphasizes the fact that ascites in uncomplicated cirrhosis is a very grave symptom. When ascites persists for a long time before death—particularly when it repeatedly recurs—it is, he thinks, largely due to disease of the peritoneum. He believes that the edema and the jaundice in cirrhosis are largely toxic, rather than obstructive. He has found primary malignant disease of the liver to be extremely rare.

The influence of hepatoptosis in producing biliary obstruction and jaundice has been investigated experimentally by J. Dutton Steele,³ who finds that descent of the liver causes an increase in the pressure in the bile passages, and may even double this pressure. This is apparently the explanation of the jaundice that sometimes occurs in these cases. He believes abdominal pain to be the most common subjective symptom in hepatoptosis, the pain being often relieved by replacing the liver. Jaundice is quite common and is often transitory. Some points of interest in relation to the important subject of acute cholelithiasis were noted in discussion by v. Leyden⁴ and Senator,⁵ the former referring

¹ *Lancet*, May 30, 1903.

² *Brit. Med. Jour.*, Mar. 7, 1903.

³ *Univ. Penna. Med. Bull.*, Jan., 1903.

⁴ *Zent. f. inn. Med.*, 1903, p. 189.

⁵ *Ibid.*

to the fact that in cases of perforation of the gall-bladder the peritonitis runs a very insidious course, and the latter directing attention to the fact that no air escapes into the peritoneal cavity in these cases, a point that distinguishes them somewhat from other instances of perforation into the peritoneal cavity. H. Strauss,¹ in discussing a case of cholelithiasis, mentioned the fact that leukocytosis was present, yet no suppuration was found at autopsy,—an observation of importance in relation to the prevalent view that leukocytosis always indicates pus in these cases. The behavior of the leukocytes in liver-disease is an uncertain indication of the conditions present; it is well known that leukocytosis is likely to be absent in many cases of extensive suppurative disease (cholangitis, abscess) of the liver.

DISEASES OF THE KIDNEY

A useful method of determining the excretory power of the kidneys is believed by G. Klemperer² to be found in a rough determination of the amount of urinary pigment excreted. His method consists in comparing the color with solutions of dyes. He thinks that, particularly in heart-disease, this is of importance, a large amount of pigments being much more satisfactory than a small amount.

The condition commonly called phosphaturia is discussed by A. Freudenberg,³ who believes that the deposit of phosphates is really due to the presence of an abnormal amount of ammonia or of ammonia in abnormal combination. Whether this is true or not, so-called phosphaturia is certainly not, as a rule, due to excessive excretion of phosphates, but is dependent upon some other abnormality. Freudenberg believes that a spontaneous deposition of phosphates or their deposition upon boiling is often an evidence of a neurasthenic state, and that improvement in this urinary condition is often a satisfactory index of general improvement. The nature of phosphaturia has also been studied by A. Soetbeer⁴ and by A. Soetbeer and H. Krieger,⁵ who believe that the disorder is due to a reduction in the excretion of calcium from the colon, which is probably dependent upon catarrh of the colon. The calcium, consequently, is excreted in the urine in abnormally large amount and this tends to cause precipitation of calcium phosphate. They believe that the condition may be satisfactorily treated from this

¹ *Zent. f. inn. Med.*, 1903, p. 242.

² *Berl. klin. Woch.*, Apr. 6, 1903.

³ *Deut. med. Woch.*, Sept. 17, 1903.

⁴ *Jahrb. f. Kinderheilk.*, Bd. lvi, p. 11.

⁵ *Deut. Arch. f. klin. Med.*, Bd. lxxii.

stand-point. Their theory seems unsatisfactory and an insufficient explanation. The nature of chyluria has been investigated by R. Waldvogel and A. Bickel,¹ who report some interesting observations of the influence of different forms of diet. They insist that chyluria is probably not really an actual mixture of chyle and urine. The condition is quite possibly due to the emptying of chyle into the blood in abnormally large amount, some of the albumin and the fat escaping into the urine because they are present in the blood in excess.

ALBUMINURIA.—An observation of marked importance to the clinician is that of B. Hallauer,² concerning the influence of concentration of the urine upon reactions for albumin. He finds that mere artificial concentration of the urine will cause the nitric acid ring-test and the acetic acid-potassium ferrocyanid test to be negative, although these tests will immediately become positive if the urine be diluted. Even the boiling test may become entirely negative if the urine is markedly concentrated. The causes of the interference with the reaction are noted. The moral to be drawn from these observations is, of course, that particularly where urine is concentrated, tests for albumin should be carried out after dilution if they have previously been negative. The same thing has long been known to be true concerning sugar tests.

That interesting condition, cyclic albuminuria, has, during the past year, received a good deal of study, particularly from L. Kuttner,³ O. Jacobson,⁴ G. A. Sutherland,⁵ and R. Edel.⁶ The most valuable paper is that of Kuttner, who goes extensively into the condition, and reports a large series of clinical observations. He particularly insists upon the importance of determining that the substance that gives the reaction is serum-albumin, and not nucleo-albumin. This is not ordinarily done by practitioners. Nucleo-albumin, while it is of importance in many cases, is, as a general rule, much less important than is serum-albumin. In discussing the significance of cyclic albuminuria, Kuttner refers to the frequency with which he found evidences of serious disease in his cases. He concludes that cyclic albuminuria does not constitute definite proof that actual disease is present, but that we have also no good evidence that organic change is absent in such cases. He believes that changes in the blood-pressure cannot explain many of the cases. Edel, on the contrary, takes the view that he has previously expressed,

¹ Deut. Arch. f. klin. Med., Bd. lxxiv, Hefte 5 and 6.

² Münch. med. Woch., Sept. 8, 1903.

³ Zeit. f. klin. Med., Bd. xlvii, Hefte 5 and 6.

⁴ Berl. klin. Woch., Oct. 5, 1903.

⁵ Amer. Jour. Med. Sci., Aug., 1903.

⁶ Deut. med. Woch., Sept. 3 and 10, 1903.

that the condition is due to variations in the circulation, and describes a series of studies that he has made concerning the effects of baths at various temperatures, of bicycling, and of other forms of exercise. He believes that he has demonstrated experimentally that disturbance of the circulation is the cause of the albuminuria. He thinks that systematically regulated and gradually increased exercise is the most important point in treating these cases. Jacobson considers that the diagnosis should be made only when albumin is present in the morning urine but is constantly absent in that of the evening. He inclines to refer the condition to nervous causes, and thinks that this variety of albuminuria is an indication of general nervous exhaustion. Sutherland more particularly refers to the relation between orthostatic albuminuria and movable kidney, reporting a series of observations to indicate that there is a definite relation between these two conditions. He states that he has seen more cases of movable kidney in children among 40 patients with orthostatic albuminuria than among all the other patients examined at a children's hospital during a service of fifteen years. He believes that the condition is due to vasomotor disturbance. In cases associated with movable kidney, he has had good results from the use of abdominal binders. An experimental and clinical study of alimentary albuminuria has been undertaken by Inouye.¹ He believes that if albuminuria occurs after the free ingestion of albumin, this indicates that the kidneys are defective functionally, although they may not be actually diseased. He gave from 4 to 8 raw eggs to patients and afterward tested the urine, and in 8 out of 22 supposedly normal persons he found albumin present in the urine. He thinks that this method may be of value in studying the functional capacity of the kidneys, both in nephritis and in conditions in which nephritis is apparently absent. The importance of trauma in producing albuminuria has been discussed by F. Engel,² who describes a case in which he believes an albuminuria of considerable duration was produced by an injury to the region of the kidney.

An observation of much importance in relation to the use of the salicylates in rheumatism and other conditions is described by H. Lüthje.³ Large doses of salicylates are known to be irritating to the kidneys; but the author, in a large series of cases, has made the striking observation that in all instances the use of even comparatively small amounts of these drugs caused the appearance of albumin or casts, or both, in

¹ Deut. Arch. f. klin. Med., Bd. lxxv, Hefte 3-5.

² Berl. klin. Woch., Mar. 9, 1903.

³ Deut. Arch. f. klin. Med., Bd. lxxiv, Hefte 1 and 2.

the urine. It is evident that the salicylates should be employed with great care when there is any sign of renal irritation. The author's observations also lead him to the view that casts are formed both from renal epithelium and from transuded albumin; and he thinks that he has seen cylindroids formed directly from renal epithelium. The occurrence of albuminuria and casts in erysipelas has been investigated by R. Pollatschek,¹ who notes that they are frequently present in erysipelas, certainly occurring in more than one-third of the cases.

The cause of the cardiac hypertrophy that occurs in nephritis has been discussed by Senator,² F. Erben,³ and C. Hirsch and C. Beck.⁴ Senator chiefly refers to the work of Strauss, which demonstrated an increase in the molecular concentration of the blood in chronic contracted kidney. Erben believes that he has proved that there is a loss of albumin from the blood and a substitution of globulin; and he thinks that the albumin-hunger of the tissues causes the heart to work harder, in attempting to supply the deficiency, thus producing cardiac hypertrophy. Other conditions, such as increased viscosity, the retention of extractives, and the production of actual toxic substances, may have some influence; but the author thinks that they occupy a subsidiary position. Erben's explanation is, however, not satisfactory, because a reduction in albumin is found in a good many other conditions in the absence of cardiac hypertrophy. Hirsch and Beck reach the conclusion that increased viscosity of the blood is not the chief cause of the hypertrophy.

The reflexes in nephritis have been studied by A. Lion,⁵ who considers that the approach of uremia almost always causes the knee-jerk to become decidedly excited, though if edema is present, it may, of course, be impossible to determine this satisfactorily. This excitation of the knee-jerks often occurs when all the usual symptoms of uremia are absent and remain absent for a long time afterward. This, the author believes to be further proof of the view that most of the symptoms in nephritis are really uremic, although what is clinically termed uremia may be long postponed. He thinks that if the knee-jerks are much excited, or show increasing activity, the case is likely to do badly, but that decreasing excitability of the knee-jerks is a favorable sign.

A point of a great deal of importance that is frequently mentioned, but for which an explanation has rarely been attempted, is the fact

¹ *Zent. f. inn. Med.*, May 16, 1903.

² *Deut. med. Woch.*, Jan. 1, 1903.

³ *Zeit. f. klin. Med.*, Bd. 1, Hefte 5 and 6.

⁴ *Deut. Arch. f. klin. Med.*, Bd. lxxii.

⁵ *Zeit. f. klin. Med.*, Bd. 1, Hefte 3 and 4.

that albumin is not uncommonly found in the urine when casts are absent. There can be little doubt that in many of these cases the cause is not actually original absence of the casts, but their destruction,—chiefly by bacteria. This probably occurs sometimes in the bladder, but more frequently after the urine has been passed and has been allowed to stand for some time before being examined. Some interesting observations on this question have been made by A. Trautlein,¹ who finds that the solution of the casts seems to be almost entirely due to bacterial action, and chiefly to that of the *Bacterium coli*. There is every reason to think that it may sometimes occur in the bladder or in the pelvis of the kidney. It probably takes place only when the bacteria themselves are present, as they apparently do not provide a ferment that is in itself capable of producing the condition. To prevent it, one should, of course, add an antiseptic to the urine.

The diagnosis of nephritis has received a good deal of attention. Senator² refers to his previously expressed view that nephritis may be distinguished from disease of the lower urinary passages, in difficult cases, by the fact that in nephritis the leukocytes are chiefly mononuclear, while in inflammation of the lower urinary passages, they are often polymorphonuclear. O. Pielicke³ refers to a case in which the use of phlorizin for diagnostic purposes caused severe evidences of renal irritation. This case constitutes an additional reason for doubting whether one is justified in using this substance in diagnosis. A. Landau,⁴ in a study of the use of methylene blue in diagnosis, reaches the conclusion that the results are almost wholly unsatisfactory,—a conclusion to be expected from the recent work of others. H. Strauss⁵ concludes his extensive studies of urinary cryoscopy with the statement that this method is, as ordinarily carried out, not in the least to be depended upon. The results are largely influenced by differences in the amounts of food ingested and in the time of day, by temporary peculiarities of metabolism in the individual, and by other factors; and these make the results utterly unsatisfactory. He describes some elaborate methods that he has devised, which, he thinks, may prove to be of some value in using urinary cryoscopy; but his results are, as yet, of very uncertain importance. B. S. Grim⁶ has made a series of clinical observations concerning the value of urinary cryos-

¹ Münch. med. Woch., Sept. 1, 1903.

² Berl. klin. Woch., May 25 and June 1, 1903.

³ Zent. f. Harn- u. Sexualorgane, Bd. xiii, Heft 10.

⁴ Zent. f. inn. Med., Bd. xlv, Hefte 1-4.

⁵ Zent. f. inn. Med., Bd. xlvii, Hefte 5 and 6.

⁶ Phila. Med. Jour., Mar. 21, 1903.

copy, and thinks that it is the most delicate test that we have for estimating the effects of therapeutic measures directed toward cardiac and renal lesions. There can be very little question that urinary cryoscopy is of little clinical value, except in detecting the seat and severity of unilateral lesions of the kidney. In such cases its actual importance may, perhaps, be great, but is as yet somewhat questionable.

L. Mohr and C. Dapper¹ contribute some further observations on the line of those that have recently been published by these authors, and by others of v. Noorden's students, concerning metabolism in nephritis. In this investigation they especially studied the influence of large amounts of fluid upon the course of the disease of the kidneys. They find that the most satisfactory amount of fluid is usually about a quart and a half. They insist that a large amount is much more likely to do harm than to do good. The amount may be restricted below this point if there is severe cardiac weakness or marked edema, but in that case the patient should have an occasional day of free water-drinking. Some similar studies are contributed by C. v. Rzetkowski.² His investigations indicate that the general tendency has been to restrict nitrogenous food too greatly in chronic nephritis, so that the patient loses tissue, and consequently loses in general health. The author insists that one should give enough nitrogenous food in chronic nephritis to cause a slight putting on of tissue, so long as no unfavorable symptoms occur; for the disease has usually caused a tissue-loss already. A strict milk diet is objectionable, because if milk is used in sufficient quantity to furnish a proper amount of food, it necessitates the ingestion of a very large bulk of fluid and damages the heart and the vessels. He recommends the use of a fairly large amount of readily digested carbohydrates and fats, with a moderate amount of nitrogenous food. One should carefully avoid large quantities of table-salt or other mineral salts, spices, meat-extracts, and similar substances that are excreted by the kidneys and are somewhat irritating to these organs

¹ Zeit. f. klin. Med., Bd. l, Hefte 5 and 6.

² Zeit. f. klin. Med., Bd. xlvi, Hefte 1-4.

SURGERY

BY JOSEPH C. BLOODGOOD, M.D.,

Associate Professor of Surgery, Johns Hopkins University, Baltimore

PROGRESS in surgery is estimated not only by the increasing number of immediate and ultimate cures, but by the introduction of surgical intervention for the relief of pathologic lesions heretofore considered to be beyond the domain of surgery. That surgical intervention is gradually enlarging its fields in territory, formerly considered within the exclusive jurisdiction of internal medicine, should not be considered the triumph of surgery alone. Equal credit should be given to the medical clinician. The hope of progress in surgery depends upon the co-operation of the two great branches.

It appears to me that the fault at the present time is that surgical technic is in advance of surgical diagnosis. That technic is absolutely essential to safe surgery cannot be denied, but on the other hand, surgeons must not be content to develop technic only. The fault seems to be that the surgeon is prone to resort to operative intervention before giving the case in question sufficient clinical study. A careful clinical history, an examination and a thoughtful analysis of the facts obtained by such an examination, will never delay operative intervention. Frequently such an analysis will prevent an unnecessary operation. This more painstaking clinical study will always leave a record of the greatest value for future study when cases of the same character accumulate.

I am impressed with the fact that many surgeons become skilled operators long before they become expert diagnosticians. The records of many large surgical clinics are of little value for a thorough study of any group of surgical lesions. Much of the successful surgery in this and other countries is due as much to the thorough clinical investigation by the physician as to the skill of the operator.

Records of the Surgical Clinic.—How much progress has been made recently in this very important department is difficult to estimate. Apparently there is a general feeling of dissatisfaction in all the large hospitals throughout the country. This, of course, is the first step toward improvement. That there is room for improvement cannot be denied; that the hope of surgery depends upon such improvements in the records is self-evident. How it is to be best accomplished in different environments is by no means settled.

These records must be kept by the hospital residents. The improve-

ment of the standard of the hospital interne rests upon the medical school, and therefore upon improved methods of medical instruction. For this reason progress in this department will be slow. In the majority of hospitals in this country, especially in the surgical clinics, the resident's time is too occupied with surgical dressings and operations to allow opportunity for the clerical work necessary for proper surgical records. Even the properly trained resident surgeon is swamped in the morass of surgical technic. For this reason hospital trustees must be convinced that surgery of to-day requires an increase in the number of the assistants in the surgical clinic. In hospitals in the neighborhood of, or in connection with, medical schools, the student should be introduced into the hospital ward as an assistant to the resident. There is no question that the introduction of students into the hospital ward improves greatly not only the records, but the careful observation of the patients, provided the student is properly trained and supervised.

Surgical records are incomplete without the confirmation of the diagnosis of the lesion in the pathologic laboratory. Every surgical clinic should have its own laboratory in charge of a special resident, but the surgical pathologic laboratory should never be divorced from general pathologic supervision. It is hardly necessary at this time to say that every hospital should have a general pathologist.

Some system should be adopted by which the ultimate results in various groups of surgical diseases are ascertained and recorded from time to time. The condition of the patient on discharge from the hospital is never a true criterion on which to base the results of treatment.

Before devoting time to a surgical index, it is important first to accomplish good surgical records which should include not only the history and examination, a detailed account of the operation, the clinical course of the convalescence, but the confirming bacteriologic and pathologic examination and the ultimate result. These records are possible only at one time. An index can be made at any time, and the index is only of value if the records are good.

Schemes for the taking of histories, conducting examinations, etc., are valuable, and the one recently published by Montgomery H. Biggs¹ is commendable, but more important are the early training of the medical student, a sufficient number of hospital residents, and the supervision of, and encouragement from, the chief of the surgical clinic.

Even in the best surgical records a number of important data are usually neglected. For example, after the record of the clinical history and examination and before the operation there is seldom

¹ Univ. Penna. Hosp. Bull., 1902, vol. xv, p. 234.

recorded the clinical diagnosis. That it is always considered cannot be denied, but the records of what the impression, the analysis of the recorded facts gave, are seldom, if ever, written. Yet they are of the utmost value for future study and improvement in clinical diagnosis. I would suggest that the resident who first records the history and examination write his conclusions, and that the surgeon before the operation and after reading the history and going over the patient, himself dictate any new data that he may have elicited and record his own impressions, and be not afraid to commit himself to a clinical diagnosis. This should never be done after the operation, for, no matter how conscientious the surgeon, he is very apt to believe that what he found at the operation was what he expected to find.

In describing the operation too much time and space are given to the methods of incision, suturing of the wound, and other details of surgical technic, which have practically become routine in the operation in question, and too little space is devoted to the actual pathologic conditions found. Here again the operator should dictate, even though briefly, and at once, if possible, his own findings. After the operation the diagnosis should be again recorded, in order to compare it with the clinical diagnosis before operation and the pathologic diagnosis from the laboratory.

The slowness or lack of surgical progress in the individual surgeon, in the hospital clinic, and in various communities throughout the country, can be explained more by the fault in surgical records than any other factor. There is hardly a surgical clinic in the country that could not contribute its share to surgical progress if the surgical work were properly studied and recorded. The number of operations is no index of surgical progress; frequently it is the reverse; and it is often true that the more an individual surgeon operates the less he really progresses in surgical knowledge.

Contributions to Surgical Literature.—In comparison with the enormous amount of surgery done in this country the contributions are meager. This can be explained by the fault in the surgical records, and also by the fact that the temptation to report shortly some rare lesion or to rush into print with something new in technic is great. Such a contribution requires but little time. The surgeon overburdened with routine operative work is averse to the tedious, careful study of a large group of cases, and the reading of the literature on the subject. Nevertheless, progress in surgery depends more upon the latter than the former.

Surgical Literature.—The experience of one surgeon is seldom sufficient in any special group of surgical diseases to allow him to con-

sider that he is master of the subject. The conscientious surgeon should not only record and give thoughtful analysis to his own experience, but he should constantly read the contributions of his colleagues, and he should not confine himself to the literature of any one country. As a rule, different surgeons in the various countries, on account of their environment, acquire surgical experience in some disease more rapidly than their colleagues. It is on this subject that they should first make their contributions to the literature, and continue to keep the surgical world in touch with their recent advances. For example, we all turn to the contributions of Kocher for our knowledge of goiter. None of us in this country will ever have his experience.

The time has passed for the surgeon to learn diagnosis and treatment only from experience in his own cases. However, if he does not keep abreast constantly with the publications on rare and unusual lesions, this will happen.

SHOCK, COLLAPSE, AND BLOOD-PRESSURE

The last field of investigation to be entered by the practical surgeon is that devoted to the physiologic problems, the solution of which will be a mark of great progress. The investigations of Crile on shock and blood-pressure, and by Cushing and others on blood-pressure, cannot be commended too much. Crile¹ fortunately has published his work in book form. The essential conclusions of Crile's work demonstrate that we must distinguish clinically for therapeutic purposes between shock and collapse. Surgical shock is an exhaustion of the vasomotor centers, while collapse must be considered as a temporary suspension of the function of the cardiac or vasomotor mechanism, or as due to hemorrhage. In shock cardiac stimulants are contraindicated. In collapse stimulants may be used. Salt infusion has only a limited field in the treatment of shock, while it is usually very effective in collapse, especially in those forms due to hemorrhage. In shock we need some therapeutic means to act upon the peripheral vessels, a constrictor. According to Crile the best remedy is adrenalin given intravenously in salt solution, and a pneumatic rubber suit which by mechanical pressure of the limbs and abdomen overcomes and prevents the engorgement of the veins. It is too early to judge of the clinical results. A few cases so far published are very favorable.

An accurate instrument for the estimation of blood-pressure is rapidly becoming one of the instruments of precision in practical sur-

¹ Problems relating to Surgical Operations, J. B. Lippincott Company, 1901, and Blood-pressure in Surgery, *Ibid.*, 1903.

gery, of value in the estimation of shock. During operations the records of this instrument are apparently the best index of the condition of the patient, and valuable as an indication for operative manipulations. In medical cases the blood-pressure is rapidly becoming an indicator for the administration of drugs. In addition the variation in the blood-pressure is an aid in differential diagnosis. This has been studied especially by Cushing.¹

The physiologic problems in surgery are numerous. The medical school should recognize this, and the student should be given preliminary training in order that he may be prepared and stimulated for future investigation.

SURGICAL INFECTIONS

Little or no progress has been made in the treatment of these quite frequently fatal lesions. The problems in the treatment of the local infection are pretty well settled. Fortunately, with the present technic of surgery, infections following operative interventions are rare. Apparently the virulence of the pyogenic bacteria is growing less. It is thoroughly established that every local infection, if in a position for operative treatment, should immediately be subjected to this intervention. If possible, the area of infection should be excised. If this cannot be accomplished without mutilation, free incision, wide open wounds, followed by frequent irrigation, are the established and proper methods of operation. The local use of pure carbolic acid to the tissues of the infected wound is an excellent therapeutic agent which apparently is not properly understood by many of the profession.

It is with the treatment of the general infection that the surgeon is so restricted. We have as yet no antitoxin for the pyogenic bacteria.² The antitoxin of tetanus is of value only as a prophylactic measure. Apparently it has little or no positive curative effects when given after the clinical picture of tetanus has developed. Every traumatic wound in which there is a possibility of contamination with the tetanus bacillus should be regarded with suspicion, and the patient should be given a preventive dose of the antitoxin of tetanus. One is chagrined at the fearful mortality from tetanus of lacerated wounds during the last Fourth of July celebration. Past experience should have been sufficient to demand a prophylactic dose of the antitoxin in every one of these injured individuals.

¹ Amer. Jour. Med. Sciences, June, 1903.

² Welch, Johns Hopkins Hosp. Bull., December, 1902, vol. xviii, p. 285; Flexner, Amer. Jour. Med. Sciences, 1903, vol. cxxvi, p. 202.

Until laboratory investigation in the problems of immunity have discovered the curative serum for the different infections, surgeons must depend upon other means. There should be no delay in the early and proper treatment of the local infection. Recently for the general infection various intravenous remedies have been tried. Unfortunately there is little or no experimental confirmation of the efficacy of these drugs. Nevertheless, a large clinical experience seems to prove that their intravenous introduction is harmless, and that there is a definite association between the intravenous infusion and the clinical improvement in many cases. Collargol, a soluble solution of silver, introduced by Credé, of Dresden, has been used extensively in Germany; formalin, by Barrows, of New York, and others. Dr. Joseph Hume,¹ of the Union Protestant Infirmary of Baltimore, has used a solution of silver nitrate intravenously with apparently excellent results. From my personal knowledge of Dr. Hume's cases, and from the reading of the literature on this subject, I am satisfied that this therapeutic means should be given a trial in desperate cases of septicemia.

ANESTHESIA

Progress in this chapter can be described in a few words. *Spinal anesthesia* has by no means established itself. It is uncertain, and the estimated mortality so far is certainly no less than in general anesthesia. Even Bier, the originator, does not yet advocate it for general use. I have hopes that we will find spinal anesthesia valuable in operations on the prostate, bladder, and kidney in those individuals whose kidney function is very much impaired. In these cases the dangers of general narcosis are greater than in any other surgical operation, and it will be fortunate if future experience can establish that the operations can be performed with a considerable degree of certainty under spinal anesthesia, and that its effects on kidney function are at least less serious than a general narcotic.

Local Anesthesia.—This method of Halsted and Schleich has developed a wide field of usefulness. No operation, especially minor ones, which can be performed under local anesthesia should be done under general. Surgeons must familiarize themselves with the frequently difficult and always delicate technic of local anesthesia. Recently the introduction of adrenalin as an addition to the cocain solution has apparently increased the field in this narcosis. Adrenalin acts as a vasomotor constrictor. In this manner it increases the local anemia which of itself is an aid to anesthesia, and in addition increases

¹ Maryland Med. Jour., vol. xlvii, January, 1904, p. 19.

the local effect of cocain. For this reason one can use larger amounts of cocain with less danger of systemic disturbance. The combination of intraneural injections with local infiltration undoubtedly allows operative manipulations hitherto impossible under infiltration alone. The most recent, and at the same time the most thorough, publication, experimental and clinical, and with a complete *résumé* of the literature, is by H. Braun,¹ of Leipzig. Braun's numerous illustrations portray the peripheral sensory nerves and the areas of anesthesia produced by their intraneural injection. This article is undoubtedly the most important contribution to this subject for the last two years.

General Anesthesia.—Undoubtedly due to the rarity of wound complications which have been eliminated by improvement in surgical technic, and the little mortality which can be attributed to the local operation itself, surgeons have given more attention to the mortality and post-operative complications of general anesthesia. Perhaps the most important advance is the consensus of opinion that the anesthetic should be given by a specially trained anesthetist. This, of course, is not necessary or possible in all cases. Its importance as a factor in the good results after operations on patients who, on account of one or more pathologic lesions of the lungs, heart, or kidneys, are bad subjects for general anesthesia must be recognized. The expert anesthetist is one of the results of progress in this direction. The careful analysis of experience in general anesthesia is slowly developing indications and contraindications for and against the various general anesthetics. Ether undoubtedly is the anesthetic of choice. Chloroform, however, has a distinct field in cases in which ether is contraindicated, and it appears from recent publications that surgeons must give more attention to mixed narcoses; for example, the preliminary narcosis with nitrous oxid gas followed by ether or chloroform, or the various mixtures of ether and chloroform, best given separately. Thus, during ether narcosis in many patients a few drops of chloroform given now and then prevent the muscle rigidity and cyanosis which are so frequently a complication in some individuals anesthetized with ether. It is difficult to express shortly the various details in the management of a good general narcosis. Undoubtedly the rule to use as little of the anesthetic as possible should be one of choice. Complete narcosis should be established only when certain factors make it imperative. The so-called interrupted narcosis is an excellent method, one which I feel quite convinced should receive more attention in the surgical clinics in this country.

¹ Transactions of the XXXII German Surgical Congress, part ii, p. 1.

An anesthetic chart should be introduced into every surgical clinic. The keeping of this careful record stimulates the anesthetist to a more painstaking scrutiny of his anesthetized patient. As these records accumulate, one has facts instead of impressions on which to base conclusions in regard to the best method of anesthesia and the safer anesthetic.

Narcosis by the Hypodermic Injections of Scopolamin and Morphin.—Many of the terrors and the discomforts of operative surgery will be eliminated if this method of narcosis is established as certain and safe. To give a patient a hypodermic injection a few hours before the operation and to have this patient awake a few hours after the operation with memory a blank between the intervals would be ideal. Unfortunately the publications of Schneiderlin, Blos, Korff, and Heinatz demonstrate that this method of narcosis is not yet certain and has dangers. The more recent communication of Korff¹ records some slight improvements. Hartog² has used morphin-scopolamin hypodermics with the ether drop narcosis; with a small dose of the former he is able to reduce considerably the amount of the ether. This method of narcosis cannot be considered by any means established, but apparently it is an advance in the right direction.

It appears to me that our first duty in the progress in anesthesia is to eliminate the dangers and reduce the immediate and later mortality. The elimination of the elements which produce only discomfort to the patient should not be given consideration until the former is accomplished. In surgery safety must always be given first consideration.

Post-Anesthetic Complications.—All of this investigation in the improvement of anesthesia is not only to reduce the mortality, but the post-operative complications. There is one complication, however, which, although it has but a slight mortality, is one of great and lasting discomfort. We apparently have made no advance in the etiology, nor in the prevention of inflammation and thrombosis of the veins of the extremity.

BLOOD EXAMINATIONS IN SURGERY

The increased danger from a general narcosis when the percentage of hemoglobin is low was first brought to the attention of surgeons in this country at the meeting of the American Surgical Association in 1901.³ Recent experience confirms the view then expressed. The

¹ Münch. med. Woch., 1903, No. 46.

² Ibid.

³ See Transactions, vol. xix, p. 72.

value of the leukocyte count as an aid to diagnosis in various surgical lesions is growing, rather than diminishing, in importance as our experience with careful records increases. The first publications appeared in American literature. The subject has received for the first time considerable attention in the recent German Surgical Congress, in a paper by Federmann,¹ from Sonnenburg's clinic in the Moabit Hospital, in Berlin. This communication gives reference to all the German, but little of the American, literature.

We appreciate the value of a leukocyte count chiefly in the differential diagnosis of abdominal lesions. In obstruction it is one of the earliest and most certain symptoms.² The recent communications on the leukocyte count in appendicitis confirm my conclusions given before the American Surgical Association, in 1901.³ In the first 48 hours, with symptoms suggesting appendicitis, a leukocyte count of 18,000 to 20,000 is with the rarest exceptions associated with pathologic lesions which demand immediate operative intervention. In the first few hours, even much lower counts indicate immediate procedure.

The more I see appendicitis in its early stages, the greater reliance do I place on the leukocyte count as an aid in diagnosis. I am convinced that it justifies an earlier operation, and at the same time aids us to exclude other cases (not a small number) in which operation is not necessary. The interpretation of the leukocyte count in the diagnosis of typhoid perforation is one of great difficulty and would require more space for its proper discussion than can be devoted to it in this article. One is disappointed to find in a recent review of all the cases of typhoid perforation (362) that the question of the leukocytes as an aid to diagnosis is dismissed with a few lines.⁴

BLOOD CULTURES

The technic necessary to demonstrate the presence or absence of bacteria in the blood is somewhat difficult. Recently it has been developed to such a degree that the results can be considered very accurate. The demonstration of the presence or absence of the infecting agent in the blood is as yet of no great practical importance in surgery. When, however, the antitoxins of the different pyogenic bacteria are discovered, undoubtedly one will be able to ascertain in mixed local infection the chief cause of the general infection by the blood culture, and this culture will be the index for the specific antitoxin.

¹ Mittheilungen, 1903, Band xii, p. 213.

² Bloodgood, *Annals of Surgery*, vol. xxxviii, December, 1903, p. 806.

³ *Transactions*, vol. xix, p. 122.

⁴ *Annals of Surgery*, vol. xxxix, January, 1904, p. 8.

In typhoid fever careful investigations have demonstrated that the typhoid bacillus is found in the blood in many cases before the development of positive clinical symptoms or even the Widal reaction.¹

The best *résumé* on the bacteriology of the blood is presented by Rosenberger,² of Philadelphia. In his conclusion he states that in 80 per cent. of 535 cases of typhoid fever the bacillus was demonstrated in the blood. In 46 per cent. of 176 cases of various forms of infection the infecting agent was found in the circulating blood.

Bertelsmann³ has made bacteriologic examinations of the blood in various surgical infections. In 54 cases in which the cultures were sterile, 43 patients recovered and 11 died; in 47 in which the cultures were positive, 26 died and 21 recovered. These observations as well as others from the literature demonstrate that the presence of bacteria in the circulating blood, although a bad prognostic sign, is by no means incompatible with recovery.

In the analysis of the results of cases treated by intravenous infusions of collargol, formalin, and silver nitrate, blood cultures should be taken and considered.

BURNS AND SCALDS

Although there have been a few excellent contributions on the cause of death and pathology of burns,⁴ little, if anything, has been added to the treatment. In a few cases of extensive burns death results within the first and second hour, probably from shock. According to Wilms, 80 per cent. of patients die between the fourth and twenty-fourth hour. Therefore, if a burned patient lives twenty-four hours, the prognosis for ultimate recovery is very much better. This agrees with the experience in the Johns Hopkins Surgical Clinic. I have also found that the leukocyte count is a pretty accurate index of the fatality of the case. In all of the cases which recovered the leukocyte counts within the first six hours varied between 20,000 and 25,000. In the fatal cases, all of which died within 48 hours, there was a leukocytosis from 36,000 to 55,000. These counts were made between one and nine hours after the injury. The cause of death from burn can be explained

¹ Cole, Johns Hopkins Hosp. Bull., vol. xii; and Scholz and Krause, *Ztschrift. f. klin. Med.*, xli, Hefte 5 and 6.

² Amer. Jour. Med. Sciences, vol. cxxvi, August, 1903, p. 234.

³ Archiv f. klin. Chir., Band lxvii, 1902, p. 940.

⁴ Bardeen, Jour. Exper. Med., vol. ii, 1897, p. 501; Eyff, *Centralbl. f. d. Grenzgeb. der Med. u. Chir.*, vol. iv, 1901; Wilms, *Mittheilungen aus d. Grenzgeb. d. Med. u. Chir.*, 1901, vol. viii, p. 393; and Dohrn, *Deutsche Ztschrift. f. Chir.*, 1901, Band lx, p. 469.

by shock, which, apparently, is the chief etiologic factor in those cases which die immediately. In addition, according to Wilms, the loss of blood plasma and water from the burned area, and the general intoxication due to the absorption of degenerative products from the burnt surfaces, are the secondary causes of early death. Apparently therapeutic means are limited to combating these factors. The burnt patient should be kept warm, immediately dressed, and undoubtedly subcutaneous saline infusion should be given at once and continuously for two or three days.

FRACTURES

The chief progress in this chapter is undoubtedly due to the more accurate diagnosis since the introduction of Röntgen photography.

The x-ray in the study of fractures should serve two purposes: (1) the confirmation of the diagnosis; (2) and, perhaps, the most important is its relation to the improvement in clinical diagnosis. Every case of fracture should first be carefully studied clinically and a diagnosis made, after which the x-ray negative not only pictures the exact nature of the bone injury, but teaches the surgeon the relation between the clinical picture and the fracture. Experience of this character rapidly educates the surgeon to recognize those rare varieties of fracture which before were overlooked clinically and first demonstrated after the introduction of the x-ray, and improves the surgeon's diagnostic abilities.

It is a mistake to allow the x-ray to make the diagnosis in any fracture. The relation of Röntgen photography to fractures should be the same as that of the microscope to the clinical and naked-eye diagnosis of tumors. The constant repetition of a comparative study of our clinical diagnosis with the confirming result of the x-ray or microscope will, in course of time, so improve our clinical diagnosis that we shall be able to depend with greater certainty upon its accuracy.

Recent progress in the treatment of fractures is due chiefly to two factors: accuracy of diagnosis, and proper reduction of the deformity. As to treatment, it should have for its objects retention of the fragments in their reduced position accomplished, if possible, with the simplest dressing. When osseous union is complete muscle tone should be almost as good as that present previous to the fracture, and joint function should not be restricted. To discuss properly how these results can be accomplished would require too much space.

In every recent fracture it must be decided within the first 7 or 8 days, earlier if possible, whether ideal results can be accomplished without operation. When the clinical examination or the x-ray shows that

proper reduction has not and cannot be accomplished, or when the properly reduced fragments cannot be retained by any convenient means of fracture dressings, an operation is indicated. Recent experience is rapidly teaching us what varieties of fractures are best treated by operative interference. The proper technic of the operation is by no means perfected in all its details. In many cases the reduction and fixation of the fragments after they are exposed by incision are not at all difficult. On the other hand, in not a few it is very difficult. I have found this to be true in the various fractures of the lower end of the humerus near the elbow-joint. In fractures of the head and neck of the femur and humerus, especially the former, operative reduction and fixation is frequently a very difficult procedure.

When fractures are exposed by incision the possibilities of infection are only excluded by the most rigid cleanliness. A surgeon should hesitate to operate in doubtful cases if he cannot command the best possible technic. In reducing and fixing the fragments the greatest care must be taken to preserve the attachments of the periosteum. The separation between the periosteum and the bone fragments should not be increased by the manipulations at the operation.

Whether the fracture be subjected to operative treatment or not, the ideal result depends just as much upon the proper dressing. Recent literature and my own experience impress me that the frequently observed muscle atrophy and loss of joint function are due to the constriction of the dressing and to prolonged fixation. Fragments can be held in proper position by dressings which do not interfere with circulation. Frequent change of dressing allows muscular massage and joint manipulation. Experience soon indicates what varieties of fractures demand this great additional time and attention, and what fractures will give equally as good results with less attention.

Extensions in the treatment of fractures is a method not well understood. One cannot read Bardenheuer's communications, and those of his followers, without being impressed that extension has a much wider field in the treatment of fractures. The most recent communication of Bardenheuer¹ has just appeared. It illustrates practically every scheme he has introduced and used for extension in the various forms of fractures.

TUMORS

There are a number of recent facts which should be brought to the attention of the general practitioner in regard to the diagnosis

¹ *Ztschrft. f. orthop. Chir.*, Band xii, 1903. p. 107.

and treatment of tumors, an attempt at presenting which I made recently.¹

Undoubtedly the relative frequency of benign and malignant tumors in the surgical clinic is far greater than in the observation of the general practitioner. In Professor Halsted's clinic, from its opening up to the present time, among 15,000 surgical patients there have been at least 1300 benign or malignant tumors, the proportion of benign to malignant is about 1 to 3.

During the last ten years I have devoted considerable time to the study of this class of cases, and have used the material collected for teaching surgical pathology to the third-year medical students. This investigation brought out the following facts:

In the majority of instances both carcinoma and sarcoma in their onset are local diseases and can be cured by complete removal. In many cases of carcinoma, even after metastasis has taken place to the neighboring lymphatic glands, a cure is possible when both the area involved by the tumor and its metastasis are completely removed. Failure to cure in a large proportion of malignant tumors is due to delay in treatment. The period of delay may be divided into three stages: "*x*," which we may call the period of latency of the disease, that is, the time during which the lesion has not attracted the attention of the host; "*a*," the stage during which the patient delays before seeking the advice of a physician; "*b*," the time spent by the physician in coming to some conclusion in regard to treatment.² To shorten the period "*x*," the latent stage, is beyond our power, but fortunately very few surgical diseases become incurable during this period. Before attempting to shorten the second stage "*a*," that is, the time during which the individual waits, we should attempt to correct our shortcomings. Without much doubt the far better results of the early operative intervention will soon reach the public and shorten the second stage of delay. Therefore, the paramount object of surgical diagnosis is to recognize a tumor in that stage in which operative removal will not only give the best insurance of a permanent cure, but will accomplish a cure with the least danger to life and mutilation of the individual.

The hope, therefore, for improvement in the permanent results from malignant tumors rests with the general practitioner. It is he who, as a rule, sees the patient first.

It is the duty of large surgical clinics to prove by undisputed facts, based upon the accumulated experience of careful records, that per-

¹ Detroit Med. Jour., February, 1904.

² See Schönholzer, Beiträge zur klin. Chir., 1903, Band xxxix, p. 162.

manent results in malignant tumors depend upon early, the very earliest possible operative intervention. Having impressed the general practitioner that delay is never justifiable in the treatment of a tumor, it will then be time to educate the laity to seek advice the moment their attention is attracted by any tumor formation.

The Clinical Diagnosis of Tumors.—For the purpose of practical results, tumors may be divided clinically into three classes: benign, malignant, and doubtful.

Clinically Benign Tumors.—It is possible in a number of instances to make a positive clinical diagnosis that the new formation is benign. An operation is only indicated on account of the size or discomfort of the tumor, or because experience has demonstrated that this particular variety of benign tumor has a tendency to become malignant. The responsibility assumed in making a diagnosis of a benign tumor and advising against operation is very great, and no physician or surgeon should assume such responsibility, except in those cases in which there is absolutely no doubt in regard to the character of the tumor.

Clinically Malignant Tumors.—Unfortunately the majority of carcinomas and sarcomas come, at least to the surgical clinic, in that stage of the disease in which there is little or no difficulty in making a positive clinical diagnosis of a malignant tumor. Now, there is no question in regard to operative interference provided the tumor is operable. Unfortunately the study of this group of cases demonstrates that a large proportion are inoperable; for example, in carcinoma of the breast almost 30 per cent. on admission to the clinic were inoperable. In the second place, the probabilities of a cure are greatly reduced when the tumor has by its growth assumed a clinical picture in which there is no doubt as to the diagnosis of its malignancy.

The careful reading of the clinical histories in these cases demonstrates that the tumor has been present months or even years, and that the delay has been due not only to the timidity or ignorance of the individual, but to the procrastination of the physician who, frequently seeing for the first time the tumor in that stage in which a clinical diagnosis of malignancy could not be made, has waited for developments, during which time internal metastasis has taken place.

Clinically Doubtful Tumors.—All tumors not included in the first two groups belong here. We may consider a tumor clinically doubtful when the history and the examination reveal no symptom or sign on which one can base a positive diagnosis of a malignant tumor; nor are the characteristics of the tumor in question sufficiently positive to allow one to be certain that it belongs to one of the benign varieties. In this group immediate operation is demanded.

The Relation of Surgical Pathology to Clinical Diagnosis.—If my conclusions are accepted, that we must not delay in the operative treatment of a tumor until a positive clinical diagnosis can be made, if the individual seeks professional advice in the early period, and if the general practitioner, impressed that early operative intervention is demanded, refers the patient at once to the surgeon, then the surgeon must, in the majority of cases, make the correct diagnosis, not on the clinical history and examination, but, in all of those cases which are not clinically positive, he must base his diagnosis on the naked-eye appearance of the diseased tissues exposed by the knife at the exploratory operation.

It is unnecessary, except in a very few instances, to remove a piece of the diseased tissue for microscopic diagnosis. When the tumor has ulcerated and is thus exposed, a piece could be removed for microscopic examination without difficulty, and if properly done, without danger to the patient; but, as a rule, in such cases a properly trained surgeon could make the diagnosis without the microscopic examination. In other cases, *the majority*, the tumor is buried; here an exploratory incision simply to remove a piece for microscopic diagnosis necessitates two operations, and if the tumor is malignant, undoubtedly gives opportunity for general dissemination. For this reason surgeons should educate themselves in the recognition of surgical lesions by their naked-eye appearance exposed at the exploratory operation.

Instruction in surgery, therefore, to-day demands special teaching both to the post-graduate and under-graduate students, of the gross pathologic appearance of surgical diseases.¹

Improvement in the permanent results of the surgical treatment of tumors, therefore, rests more upon surgical diagnosis than upon surgical technic, and upon the education of the general public to seek professional advice at once, and upon the ability of surgeons to demonstrate by indisputable facts that the physician should at once refer all tumors to the surgeon.

The study of surgical pathology clearly proves that it is possible, in the majority of cases, to recognize the character of the new growth by its naked-eye appearance. From this study one is also impressed that we can as a rule not only differentiate the benign from the malignant at the exploratory incision, but recognize in the malignant tumors the different groups which vary in their degree of malignancy, and in the benign, tumors which have a tendency to become malignant. This

¹ *Methods of Instruction in Surgical Pathology*, read before the Amer. Surg. Assoc., May 4, 1903, in Washington, D. C.; *Progressive Medicine*, December, 1903; *Johns Hopkins Hosp. Bull.*, 1903, vol. xiv, August.

knowledge, if the patient comes to the operation earlier in the disease, allows less mutilation in the less malignant tumors.

These facts, I think, will be better emphasized by a short *résumé* of the more important groups of benign and malignant tumors.

Sarcoma of the Skin.—In this group of malignant tumors the possibility of a hopeless internal metastasis during the period "x" (latent stage) seems greater than in any other neoplasm. Among 42 cases, 12 (30 per cent.) were inoperable on account of internal metastasis. Among the remaining 30 cases only 3, or 10 per cent., have been cured. We may classify sarcoma of the skin into the following groups: Lymphangiosarcoma, hemangiosarcoma, sarcoma arising in skin scars, and mycosis fungoides.

Lymphangiosarcoma.—In 14 cases the malignant tumor developed in a congenital pigmented mole. The pathetic results demonstrate that in the future such moles must be removed the moment any change is observed in them by the patient. Three individuals between the ages of 52 and 67 years came to the clinic between three and six months after they had observed slight growth in a congenital pigmented mole. The tumors were immediately excised, but all three patients succumbed to internal metastasis within a year. Fig. 1 pictures a pedunculated, apparently harmless, mole in a woman 67 years of age, in which slight growth had been observed but 3 months, associated with superficial ulceration of the epidermis. A few months after the removal of the tumor extensive metastatic involvement of the glands of the axilla and neck appeared. In these three patients there was just as much reason for them to seek advice one week after the first change was observed in the mole as later.

In three patients there was evidence of metastasis when they were admitted to the clinic. The ages of the individuals varied from 33 to 74 years, and the duration of the slight growth in the mole from 2 to 10 years; evidence of metastasis, from 3 to 14 months. Perhaps here a very early excision of the mole might have resulted in a cure (Fig. 2).

Two patients were admitted to the clinic with inoperable metastasis, with a history that a small congenital mole had been removed 11 months and 2 years previously. Three patients were admitted to the clinic whose attention had been attracted only by the metastatic tumors which had been present 3 months to 2 years. These patients had observed no change in the congenital pigmented mole. In three instances after the removal of the mole local recurrence in the scar took place and the patient sought advice of the surgical clinic for the recurrent tumors. In one of these patients the tumor had been removed

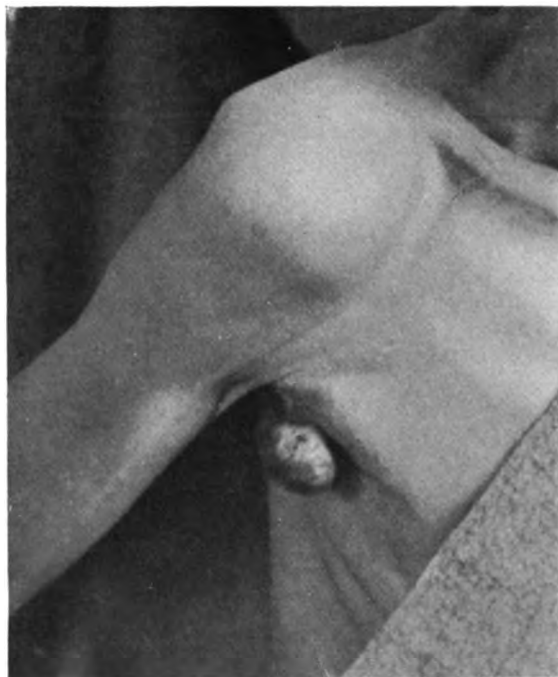


FIG. 1.—Congenital pigmented, apparently benign, mole. Extensive metastasis occurred a few months after removal.

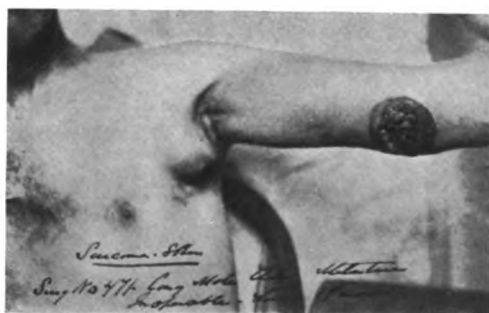


FIG. 2.—Congenital pigmented mole with axillary metastasis at the end of fourteen months. Complete excision. Death in five months.



FIG. 8.—Pigmented lymphangiosarcoma. Death in four months from metastasis.



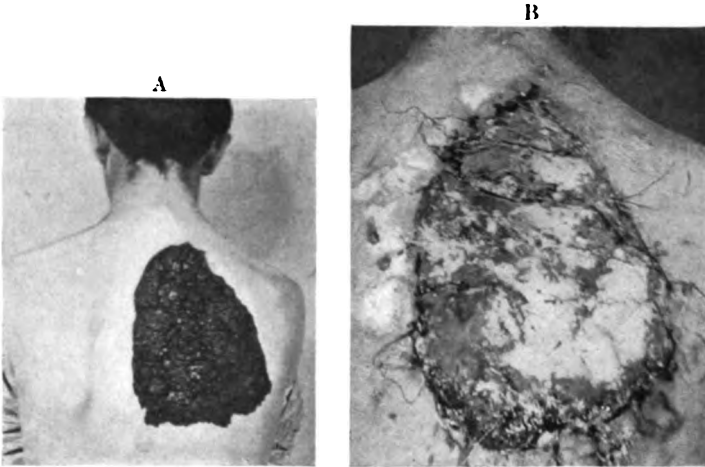
FIG. 4.—Excision of a congenital pigmented mole, five years. Fungous tumor in scar at the end of two years. Complete removal. Cured six years. (Sketch of patient and gross specimen.)



FIG. 5.—Congenital mole; slow growth for twenty years. Excision.
Cured four years.



FIG. 6.—Typical hairy, congenital, pigmented mole; slow growth.
Excision. Cured three years.



**FIG. 7.—Congenital pigmented mole; slow growth. Excision. Cured three years.
A. Tumor; B. Skin-grafted area.**



FIG. 8.—Congenital pigmented mole; no growth. Excision. Well one year.

but 4 months previously and had immediately recurred. Histologically the removed recurrent tumor was a pigmented lymphangiosarcoma, and this individual died of internal metastasis 4 months later (Fig. 3). In the other 2 cases the congenital pigmented mole had been removed 3 to 5 years before; the recurrent ulcerated fungus growth had been present in the scar but 2 years, so there had been a free interval of 1 and 3 years. Histologically the tumors in these two cases were not lymphangiosarcoma, but fibrospindle-cell fibrosarcoma, that is, the secondary tumor could not be considered a local recurrence, but a new tumor in scar tissue (Fig. 4). These two patients have remained well from 6 to 10 years.

In 14 cases the patients were not aware of a congenital pigmented mole, the primary tumor, however, had a similar appearance to one which might have developed in a congenital pigmented mole, and histologically these tumors are identical with the lymphangiosarcoma which develops in a congenital mole. The clinical picture and results are practically identical with the group just discussed, but one patient has remained well, and in this instance similar to the other 2 cured cases there was a history that an acquired mole had been excised 8 years before, and the recurrent tumor in the scar tissue proved to be a fibrospindle-cell fibrosarcoma.

The facts brought out by this study of lymphangiosarcoma of the skin, with or without a previous history of a congenital mole, demonstrate that we should be on the lookout in patients coming under our observation for other reasons, for those varieties of congenital moles which experience has demonstrated have a tendency later in life to become malignant. We should advise the excision of such moles. At the present time we have not sufficient data to be quite certain that we can always recognize this possibility, but every elevated pigmented mole should be regarded with suspicion and removed, especially those situated in places subjected to repeated slight traumatisms. The appearance of an acquired tumor on the skin clinically like a congenital pigmented mole should immediately be removed with a wide area of skin and subcutaneous fat. The public should be instructed that the first, and even slightest, change in a congenital pigmented mole should be an indication for its immediate removal. The study of this group of cases emphasizes the fact that a congenital mole should either be left alone entirely or completely removed. Any procedure like applications of caustics has a tendency to excite malignant changes.

An acquired skin tumor clinically resembling a pigmented mole, and a growth in a congenital pigmented mole, are by no means always malignant; they may be benign. But as we have no positive diag-

nostic signs which will differentiate one from the other, immediate operation is indicated in every case (Figs. 5, 6, 7, and 8). Unna, some years ago, and Krompecher, recently, have classed these tumors with carcinoma of the skin. Krompecher advocates the view that they belong to the carcinoma basocellulare, which I shall discuss later. Whether the cells of this lymphangiosarcoma are epithelial or endothelial is of scientific interest only. These tumors belong in a group by themselves, and are characterized by early internal dissemination as compared with the slight and short growth of the primary tumor, a characteristic different from all other epithelial tumors of the skin.

The practical suggestion brought out by this investigation of congenital and acquired moles is the importance of a careful scrutiny of every mole that comes under our observation, and the education of the public to seek advice at once in this group of tumors.

Hemangiosarcoma.—In the skin we observe this tumor to arise with and without the history of a congenital nævus. Three patients, aged 43 to 46 years, were admitted to the clinic suffering with ulcerated fungous tumors of 7 months, 4 and 10 years' duration. These tumors had arisen in flat congenital vascular nævi. One tumor was inoperable; two patients died after operation from metastasis. Considering the common occurrence of congenital nævi, the possibility of a sarcoma developing in this tissue is rare. There should be little difficulty in recognizing from the clinical appearance those congenital angiomas which demand removal. Growth in these nævi is frequently observed. When the angioma simply increases in size, but retains its color, the growth is due to the increase in the blood-vessels (Fig. 9). These tumors retain their benign characteristics, compressibility and change in size. In other cases, as the angioma increases in size it becomes more solid and loses its compressibility. This change is a definite indication for immediate operation, because we cannot differentiate clinically whether this tumor is developing into a malignant one or not. The growth in some cases is due to a benign hypertrophy of the connective tissue between the vessels of the angioma,—a rare tumor (Figs. 10, 11, and 12). In other cases, the hypertrophy is due to a malignant growth, either a perithelial or endothelial angiosarcoma. These sarcomas are very malignant because of the early dissemination and should be removed at once. The three cases mentioned above belonged to the perithelial variety. On admission to the clinic there was no difficulty in the clinical diagnosis. Failure to cure in each can be attributed to delay, both by the patient and the physician (Figs. 13, 14, and 15). In four cases of perithelial angiosarcoma of the skin there was no history of a congenital nævus. The tumors had been



FIG. 9.—Congenital hemangioma in a child aged four months. Naevus flat at birth; slow growth, no ulceration. Excision. Cured six years.

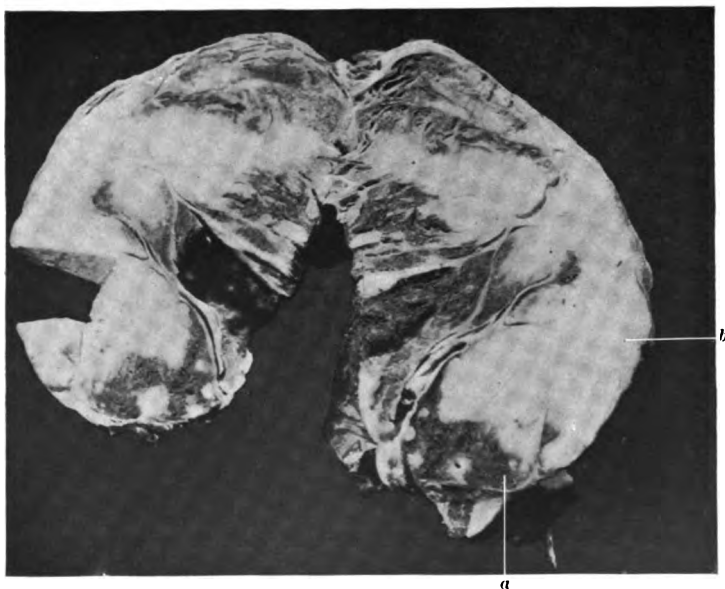


FIG. 10.—Fibrohemangioma (elephantoid hemangioma) of the palmar surface of the thumb, of three years' duration. Partial excision. Cured two years. *a*, angioma; *b*, fibroma.



FIG. 11.—Fibrohemangioma of the skin near the ankle, of ten years' duration. Pedunculated. Excision. Cured one year. *c.* skin pedicle.

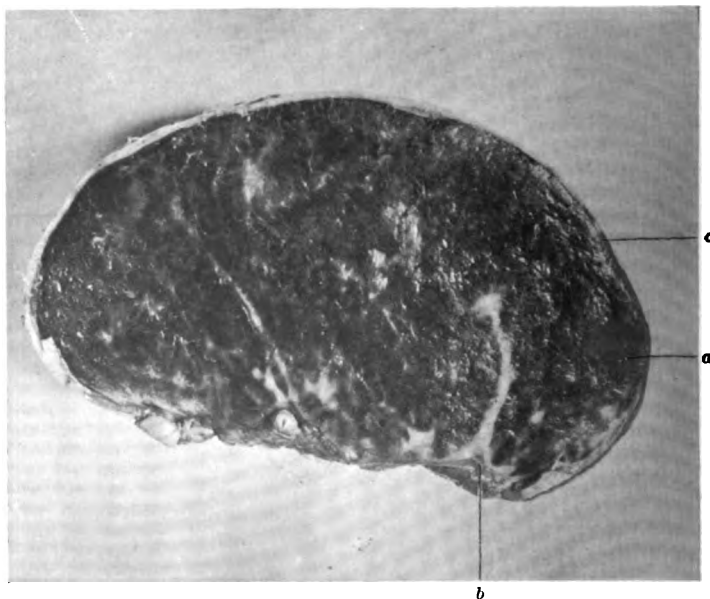


FIG. 12.—Fibrohemangioma of the skin near the ankle, of ten years' duration,—cut surface. (Same as Fig. 11.) *a.* angioma; *b.* fibroma; *c.* skin.



FIG. 13.—Congenital naevus, of four years' duration, with beginning ulceration. Excision. Death in eleven months. Perithelial angiosarcoma. Photograph of patient and excised tumor.



FIG. 14.—Congenital pigmented naevus of two years' duration. Partial removal, rapid recurrence, complete excision of recurrent growth and axillary glands, followed by death in a few months. Photograph of patient.



FIG. 15.—Congenital pigmented naevus—perithelial angiosarcoma. (Same as Fig. 14.)



FIG. 16.—Surface and section surface of excised recurrent cicatricial keloid. The keloid was excised after it had existed five years; recurrence ensued at the end of two years; again excision. At the end of three years there is a very small keloid in the scar.

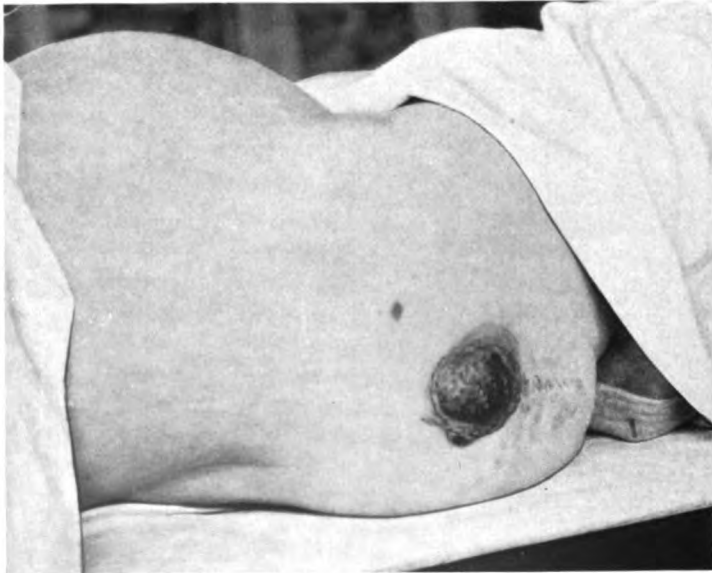


FIG. 17.—Fibrosarcoma of the abdominal wall with internal metastasis.

present 2, 3, and 7 years, in individuals aged 36 to 54 years. On admission the tumors were clinically malignant, operable locally, but death took place from internal metastases. That earlier intervention was possible in all is evident.

Sarcoma in Skin Scars.—In the great majority of cases it is the epithelium at the border of the unhealed ulcer that gives rise to the malignant tumors. Sarcoma from the connective-tissue cells of scar tissue is rare. We have previously noted three cases in which after the removal of a congenital mole (2 cases) and after the removal of an acquired mole (one case), a tumor has developed in the scar tissue which proved to be not a recurrence of the primary tumor, but a fibro-spindle-cell fibrosarcoma, which probably originated in the connective tissue of the cicatrix. These tumors, because they belong to a variety of sarcoma of less malignancy, have been cured, although in each case there was delay in operative intervention. The prognosis, however, for sarcoma in scar tissue of the skin is not always so good. We have observed three other cases: one in the scar of a burn, a second in the scar of an old bullet wound, and a third in the cicatrix produced by a traumatism from a lump of coal. The tumors were of 3 months' and 2 years' duration. All were spindle-cell and round-cell sarcomas, clinically malignant. The patients succumbed to internal metastasis.

There is little difficulty to recognize the benign connective-tissue tumor of scar tissue, the so-called cicatricial keloid. It forms quickly, limits itself to the domain of the scar, and the epidermal covering remains intact (Fig. 16). All other hypertrophy of skin scars should be regarded with suspicion and immediately completely excised.

The Benign Tumors of the Skin.—The lymphangioma and hemangioma have been discussed. The multiple neurofibroma (fibroma molluscum) is not difficult to recognize clinically, but we must bear in mind the possibility of a sarcoma developing from the connective tissue of one of these tumors. This should also be recognized clinically in time to effect a cure by complete removal. Here internal metastasis seldom, if ever, takes place until the tumor reaches considerable size. Growth in one or more of the multiple neurofibromas should be an indication for its removal. The single fibromas of the skin are rare. There is not much difficulty in their clinical recognition. Patients, however, should be advised to have the little tumor removed, because not infrequently, after they have been present for years, they undergo malignant change and rapidly give rise to metastasis. In a recent observation this point is well illustrated. A healthy woman, 35 years of age, had observed on the skin of the thigh a hard, mushroom tumor for three years. There had been superficial ulceration of the epidermis

six months, and symptoms of some abdominal trouble six weeks. The appearance of the tumor and distended abdomen is shown in Fig. 17. The exploratory laparotomy revealed blood-stained fluid and inoperable post-peritoneal metastatic glands. This originally apparently benign tumor had been seen by her physician at two pregnancies, three and one and a half years ago. Its removal should have been urged at that time. Undoubtedly if this had been done the patient would be living to-day.

The lipoma of the skin is quite characteristic, clinically. It has no tendency to become malignant. Removal is indicated for cosmetic effects only, or to insure the patient against a more extensive operation later, as the tumor quite frequently grows to great size (Figs. 18 and 19).

Conclusions as to Tumors of the Skin.—Both the physician and the surgeon constantly see these benign tumors of the skin, at their examination of patients who seek their advice for other conditions. The unfortunate experience of the surgical treatment of those few cases in which the benign skin tumor has become malignant should convince the profession that improvement in our results depends upon the removal of these apparently innocent tumors in the benign stage.

Lack of space prevents further illustrations, but the important points brought out in the study of the benign and malignant tumors of the skin are confirmed in the investigation, clinical and pathologic in the other groups of tumors.

I have purposely omitted the discussion of the x-ray treatment of carcinoma and sarcoma. The study of the ultimate results clearly proves that the number of permanent cures after the complete excision of sarcoma and carcinoma in its early stage are too many to justify the treatment of any operable tumor with the x-ray, except in a few cases. For example, in superficial epithelioma of the skin, situated near the eyes, nose, and ear, in which complete removal would produce much mutilation, an x-ray treatment can be given a trial. Clinical and pathologic studies of these superficial epitheliomas demonstrate that they belong in the majority of cases to the least malignant form of skin carcinoma, called by Krompecher¹ carcinoma basocellulare. The majority of skin carcinomas which clinically are called a rodent ulcer belong to this group. The literature on x-ray brings out the fact that the best results, and even some apparent cures, have been accomplished in this group of skin carcinoma. It is a question whether it is justifiable to use the x-ray, and thus delay complete excision in

¹ Der Basalzellenkrebs, Gustav Fischer, Jena, 1903.



FIG. 18.—Pedunculated lipoma with elephantiasis of the skin, of eighteen years' duration. Patient, and cut surface of the growth.



FIG. 19.—Pedunculated lipoma with elephantiasis of the skin of thirty-five years' duration.

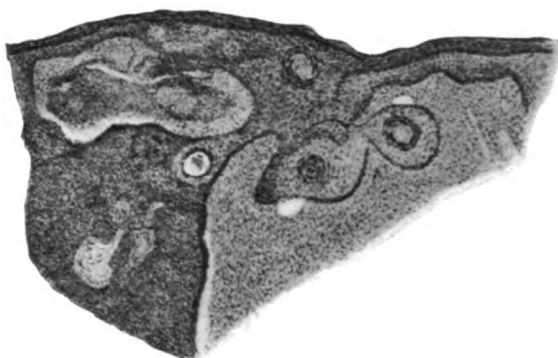


FIG. 20.—Carcinoma basocellulare solidum dorsi. Origin of basal cell cancer from the basal epithelium of an elongated rete villus which encloses an epithelial sphere. The tumor tissue consists of oval, oblong cells with little protoplasm and chromatin rich nuclei, and corresponds from its cellular character to sarcoma tissue. (Krompecher.)



FIG. 21.—Carcinoma basocellulare adenoides faciei. Multicentric origin of the basal cell cancer from the basal epithelium of the epidermis. On the left continuous transition of the superficial epithelium into tumor tissue grown like folds. At a sharp demarcation of the tumor tissue from the epidermis. (Krompecher.)

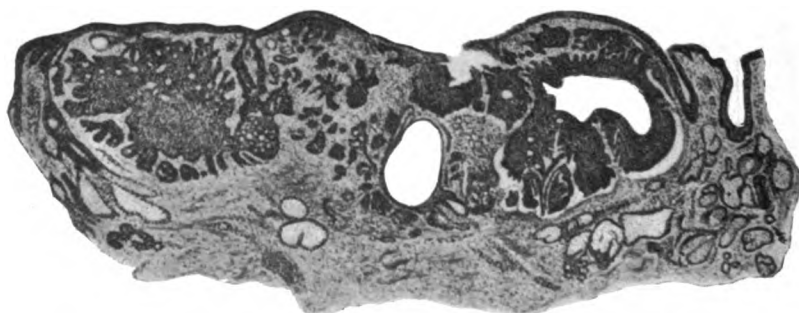


FIG. 22.—Carcinoma basocellulare solidum faciei. On the left solid and adenoid, on the right cystic basal cell formations of the same structure as that in Fig. 20. (Krompecher.)

any other form of malignant epithelioma. Figs. 20, 21, and 22, from Krompecher, are beautiful microscopic drawings of the most common carcinoma basocellulare.

It is apparently justifiable to use the x-ray in giant-cell sarcoma of bone and in the fibrospindle-cell fibrosarcoma of bone and soft parts, in which, on account of local infiltration, amputation would be necessary to effect complete removal. Clinical and pathologic investigations of this group of tumors place them among the least malignant of all sarcomas. Metastasis takes place, if at all, only very late. For this reason the patient does not run the risk of internal dissemination during x-ray treatment.

SURGERY OF THE STOMACH

During the last year more important contributions have appeared on this chapter of abdominal surgery than on any other lesion of the abdomen. The majority of German clinics have given us the *résumé* of their experience during the last 10 to 20 years, both in benign and malignant diseases. Mayo,¹ of Rochester, whose experience in surgery of the stomach is probably the greatest in this country, has published a review of his 303 operations. A most interesting discussion took place on May 11, 1903, before the Philadelphia Academy of Surgery, by von Mikulicz, of Breslau; Moynihan, of Leeds; Mayo, and others.

The lesions of the stomach which are of chief interest to both physician and surgeon are ulcer and carcinoma.

ULCER OF THE STOMACH.—The most absorbing question at the present time is in regard to the diagnosis and treatment of simple ulcer of the stomach. We may define simple ulcer as one in which none of the more pronounced secondary complications are present which demand operation. As will be discussed later, there seems to be no question now in regard to surgical intervention in perforation of a gastric or duodenal ulcer, for the relief of hemorrhage, and in all cases of ulcer which have produced stenosis, perigastric inflammations, or localized abscesses. The question, however, as to whether medical or surgical treatment will give the best results in simple ulcer is by no means settled.

The solution of the problem is one that will require extensive and painstaking studies of the results, both immediate and ultimate, of cases of gastric ulcer treated medically in the large clinics throughout the world. The problem was first discussed in 1896 by von Mikulicz, who claimed, in advocating surgical treatment of gastric ulcer,

¹ *Annals of Surgery*, vol. xxxviii, July, 1903, p. 30.

that the mortality of internal treatment varied from 20 to 30 per cent. In the German Surgical Congress for 1897, the subject of gastric ulcer received prominent attention again by von Mikulicz, from the surgical stand-point, and by von Leube, from the medical. The latter stated that the results in his medical clinic of 424 cases were as follows: 74 per cent. left the clinic well, 21.9 per cent. improved, 1.6 per cent. not improved, and 2.4 per cent. died. It is important to note, however, that von Leube admitted that among these 424 cases, in which a clinical diagnosis of gastric ulcer was made, in only 195 was there a gastric hemorrhage to clinch the diagnosis. The mortality among these 195 cases was 4.1 per cent. Unfortunately, von Leube gives the results after medical treatment only at the time of discharge from the medical clinic. Experience clearly shows that such results are no criterion on which to base the value of medical treatment. The majority of cases of gastric ulcer react quickly to rest in bed, rectal feeding followed by proper diet, and leave the hospital apparently well. When these patients are followed we find that in a large proportion (20 to 50 per cent.) there is a recurrence of the symptoms. A certain number die of hemorrhage or perforation, others become confirmed invalids on account of perigastric adhesions or stenosis. Many of these are admitted later to a surgical clinic, quite a number receive again medical treatment for the recurrence of the symptoms, and improve. With each recurrence the same category of results again takes place: permanent cures, recurrences, etc.

The best and most recent article on the ultimate results after medical treatment of gastric ulcer is by Schulz,¹ from Kast's clinic in Breslau (184 cases), and in the Hamburg-Eppendorf clinic (107 cases). Schulz considers only those cases in which gastric hemorrhage was associated with other symptoms of gastric ulcer. It is to be regretted that he does not consider in a second group those cases with symptoms suggesting gastric ulcer, but which exhibited no signs of hemorrhage. For this reason Schulz's statistics must be considered to represent the worst results of medical treatment. Undoubtedly gastric ulcer may occur without the symptom of hemorrhage.

Schulz's Results.—Among 184 patients treated in the Breslau clinic, 10 died (5.4 per cent.). The cause of death was: perforation peritonitis in 5 cases; perforation abscess in 3 cases; and hemorrhage in 2 cases. Of the 107 cases treated in the Hamburg clinic, 6 died (5.6 per cent.). The cause of death was: perforation peritonitis in 1 case;

¹ Mittheilungen aus den Grenzgebieten der Medizin und Chirurgie, 1903, Band xi, p. 20.

profuse fresh hemorrhage in 2 cases; recurrent small hemorrhages in 2 cases; and one case of ulcer carcinoma (mistaken clinical diagnosis).

Schulz's immediate mortality is 6 per cent. in case of gastric ulcer associated with hemorrhage, as compared with von Leube's 4.1 per cent. Unfortunately, Schulz does not state whether these patients who died from perforation, abscess, or hemorrhage were admitted to the clinic moribund on account of these fatal complications, or whether the complications developed while under medical treatment in the ward. This is a very important point, because if the latter be true, it would be a factor in favor of surgical intervention. Again, such complications, if they develop in the medical ward, should have been recognized in time for favorable surgical intervention. From other sources in the literature and from cases treated in the medical ward of Professor Osler, I am inclined to think that these fatal complications are very rare when the patient is resting quietly in bed under proper medical treatment. From the opening of the Johns Hopkins Hospital, in 1889, up to the present time not a single case of perforation or hemorrhage has been transferred from the medical to the surgical clinic, nor has any such complication developed under medical treatment in the ward. It must be conceded, however, that in Baltimore and its vicinity, at least the diagnosis of gastric ulcer is not very frequent. The cases admitted to the medical clinic are not many.

From the Breslau clinic, according to Schulz, 79 patients were discharged well, 84 improved, and 11 unimproved. Later information, however, was obtained from 88 patients (about 50 per cent.). The condition of these 88 patients when they left the clinic was as follows: 39 cured, 48 improved, and 1 unimproved. That 50 per cent. of the cured and improved were traced later, and only 1 of the 11 unimproved cases followed, arouses naturally the suspicion that in a certain number death has taken place. Among the 88 cases, in which the ultimate result has been ascertained, 38 (less than 50 per cent.) remain well; 23 still have gastric discomfort; 19 must be classed as unimproved; and 8 (9 per cent.) died from some complication.

The results in the Hamburg clinic were about identical.

Therefore, among the 184 Breslau cases there were 18 deaths, 10 in the hospital and 8 later, a total mortality of at least 9 per cent. Of the patients who survived, according to Schulz, only 64 per cent. can be considered permanent cures. These figures, as previously stated, represent the results only of gastric ulcer associated with hemorrhage. Were the other cases of gastric ulcer added, undoubtedly the mortality would be less and the percentage of cures greater.

Undoubtedly the ultimate results would be better if these patients

returned at once for medical treatment the moment they experience a recurrence of the symptoms.

COMPARATIVE RESULTS BETWEEN MEDICAL AND SURGICAL TREATMENT OF SIMPLE GASTRIC ULCER.—If we consider first only those cases of gastric ulcer associated with hemorrhage, surgery must prove that the mortality of gastro-enterostomy is less than 6 per cent. There is little doubt from the numerous statistics of gastro-enterostomy for benign conditions of the stomach that the immediate mortality will be less than 6 per cent. It may be stated that 3 per cent. is a high figure.

However, these cases of gastro-enterostomy must be traced to their ultimate results, and the figures must demonstrate that the operation gives better insurance than medical treatment from the fatal complications, such as perforation, hemorrhage, and secondary carcinoma in the scar tissue of the ulcer. To the unfavorable results of gastro-enterostomy must be added secondary stenosis of the anastomosis and peptic ulcer of the jejunum, which so far has only been observed after gastro-enterostomy for benign diseases of the stomach. At this time there are not enough cases of gastro-enterostomy for simple ulcer of the stomach associated with hemorrhage to allow a comparative study. If, however, we utilize the results of gastro-enterostomy of the few cases performed for simple ulcer only and add those performed for profuse or recurrent hemorrhages and stenosis, the immediate and ultimate results are apparently more favorable than those from medical treatment. At the present time it would appear to be justifiable to perform gastro-enterostomy in every case of gastric ulcer in which, in addition to the other clinical symptoms, gastric hemorrhage is observed.

GASTRIC ULCER WITHOUT HEMORRHAGE.—That every patient exhibiting symptoms suggesting a simple ulcer of the stomach, but without signs of hemorrhage, should be subjected to operative intervention is by no means proved. Undoubtedly the immediate mortality from medical treatment is no greater than after gastro-enterostomy. Nor, as yet, have we figures to prove that surgical intervention will insure better permanent results. These patients should be given the benefit of internal treatment. If this fails after a fair trial operation should be considered. Even if the symptoms recur after an apparent cure it seems justifiable to give internal medication a second trial. Recurrences, however, should give rise to the consideration of surgical intervention.

CONCLUSIONS AS THE TREATMENT OF SIMPLE GASTRIC ULCER.—To accomplish the best results physicians and surgeons must work together. The medical clinics throughout the country should inves-

tigate and publish the immediate and ultimate results in their cases of simple gastric ulcer. Surgeons should be willing to wait for these conclusions before urging their admission into this new field, and should be content with those cases of gastric ulcer which recent experience demands of the physician that they be referred for surgical treatment. In addition, the surgeon should follow more carefully the permanent results of his cases of gastro-enterostomy for benign stenoses. The technic of this operation is by no means settled. This is demonstrated by the fact that Mayo,¹ even after his large experience, finds that he is not satisfied with his method of gastro-enterostomy after witnessing Professor von Mikulicz, in May, 1903, perform a posterior gastro-enterostomy in his clinic in Rochester by a method which Mayo believes was greatly superior to the one which he had been in the habit of following.

GASTRIC HEMORRHAGE.—Recent experience, especially the publication of Schulz,² should impress the physician with the greater responsibility assumed by him in cases of gastric ulcer associated with slight hemorrhage if he does not refer such cases to the surgeon. There seems to be little doubt as regards the indication for operation in profuse, fresh, and recurrent small hemorrhages from the stomach; and it is very encouraging to read, in Moynihan's paper before the American Surgical Association,³ that a simple gastro-enterostomy is sufficient, and that it is unnecessary to attack the bleeding point or surfaces directly. The view of Moynihan is confirmed by all the recent German publications on benign diseases of the stomach. Although the cases when grouped together from all the publications are relatively small in number, the results prove conclusively that gastro-enterostomy is by far the better procedure. The former methods of attacking the bleeding ulcer directly by excision, ligature, or tamponing should be discontinued in favor of gastro-enterostomy.

Moynihan makes the following excellent classification: (A) *Hemorrhage from an acute ulcer*. In these cases usually with, but now and then without, previous gastric symptoms, there is a gastric hemorrhage with the following characteristics: "spontaneity, abruptness of onset, the rapid loss of a quantity of blood, the marked tendency to spontaneous cessation, the infrequency of a repetition of the hemorrhage in anything but trivial quantity, and the transiency of the resulting anemia." According to Moynihan, operation is not indicated. Medical treatment in almost every instance will insure recovery. Though the

¹ Loc. cit.

² Loc. cit.

³ Transactions of the American Surgical Association, vol. xxi, 1903, p. 135.

hemorrhage is alarming from its suddenness and intensity, it may confidently be predicted that in the majority of cases it will not recur, and that if it recurs, the quantity of blood lost will almost certainly be small. Moynihan, however, admits that there are a few cases in which the hemorrhage may be both copious and recurrent, and may threaten the life of the patient. Operation here is indicated. I am inclined to think that cases belonging to this class are rare. The probabilities are that the surgeon would seldom see the patient at a time when there would be any question as to operation. Either the patient will be moribund from the hemorrhage, or the hemorrhage, having ceased, the indications would rather be against operative procedure at that time. Although, according to Moynihan, recurrence of hemorrhage in this group of cases is rare, I am inclined to the opinion that these patients should be given the benefit of the doubt and a gastro-enterostomy performed. That is, a profuse hemorrhage from a gastric ulcer should be an indication for a later gastro-enterostomy.

(B) *Hemorrhage from chronic ulcer.* Moynihan, for convenience, divides these into four groups: In the first, the bleeding is latent or concealed; it is recognized only by a careful examination of the stomach contents or feces. Such hemorrhages cannot be considered of themselves indications for operation. In the second group, the bleeding is copious, but transient, occurring at intervals of two to three months or more. In this group indigestion is a prominent symptom. According to Schulz's results gastro-enterostomy is indicated. Moynihan reports an excellent result from gastro-enterostomy in this class of cases. In the third group, the recurrence of the hemorrhage is frequent, now and then profuse. No one questions the positive indications of gastro-enterostomy. In the fourth group, fortunately rare, the hemorrhage is so profuse and rapid that one could not hope much from anything.

From the few cases of hemorrhage reported from each individual clinic in Germany, one is impressed with the difficulty in ascertaining what is to be the future course when this symptom arises. When the patient comes under observation for the first time on account of a profuse hemorrhage the probabilities are that one must trust to nature. Operations on patients moribund from the loss of blood have not been encouraged. Experience, however, should impress both physician and surgeon that the history of a single profuse or recurrent hemorrhages is sufficient indication for gastro-enterostomy. Death from gastric hemorrhage is almost as frequent as that from perforation. Recurrent hemorrhages are associated so quickly with grave secondary anemia that the delay will bring a patient to operation in a much worse condition and increase the possibilities of a fatal result.

Hemorrhage as an indication for operation in gastric ulcer must be emphasized, and in the future should be given more consideration.

THE CAUSE OF GASTRIC HEMORRHAGE AFTER LAPAROTOMY.—This is a rare complication, but has recently received considerable attention. Von Eiselsberg,¹ in 1899, was the first to publish cases of gastric and duodenal hemorrhage after laparotomy. As such hemorrhages only were observed after abdominal operations in which the omentum had been ligated or injured, von Eiselsberg advanced the opinion that the etiology could be explained by an embolus from a thrombosed vessel in the injured omentum. He was able, from experiment on animals, to demonstrate this possibility. Friedrich² confirmed von Eiselsberg's clinical and experimental investigations. More recently the subject has been given consideration by Hoffmann³ and Stahmer.⁴ These authorities were inclined to the view that the ulcer in the stomach or duodenum could be produced by a sterile embolus. On the other hand, Engelhardt and Neck,⁵ in their experimental work, were unable to produce ulcers with aseptic thrombi, and were inclined to the view that the embolus must be infected. It is apparently established that after an injury or the ligation of the omental vessels thrombosis may follow, and an embolism may reach the mucous membrane of the stomach or duodenum and so produce the clinical picture of post-operative hemorrhage. Fortunately, clinically, the complication is rare. This is explained by the experimental work, because but few of the animals subjected to the experimental operation developed ulcers. On the other hand, the possibility that the gastric hemorrhage is due to a gastric ulcer present before operative intervention in which the symptoms were either latent or overlooked must be borne in mind. Landow⁶ reports two such cases. In one the patient died 48 hours after operation from hemorrhage. At the autopsy three gastric ulcers were found. In the second case the patient transferred to the surgical clinic for appendicitis died three hours after the onset of the gastric hemorrhage on the morning of the day she was to be anesthetized for the operation. If the autopsy had not been performed in the first case, and the operation had been performed in the second case, both might have been recorded as post-operative gastric hemorrhages due to injury or ligation of the omentum. In neither case was there a previous

¹ Archiv f. klin. Chir., Band lix, p. 837.

² Archiv f. klin. Chir., Band lxi, Heft 4.

³ Dissertation, 1900.

⁴ Deutsche Ztschrft. f. Chir., 1901, Band lxi, p. 517.

⁵ Deutsche Ztschrft. f. Chir., 1901, Band lviii, p. 308.

⁶ Archiv f. klin. Chir., 1902, Band lxvi, p. 900.

history of ulcer. In the third case reported by Landow, the patient, although collapsed after the hemorrhage on the second day, recovered. In Dr. Halsted's surgical clinic we have observed but one case of post-operative gastric hemorrhage.¹

GASTRIC PERFORATION.—Every one should read Friedrich Brunner's communication² on this subject. Progress in surgery depends upon such studies. Unfortunately, few capable of making these exhaustive *résumés* of the literature are willing to give the time and labor. There is a crying need for publications of this character in America. We need, first, from the larger clinics, exhaustive and critical reviews of the experience of the clinic on the common surgical diseases. For example, appendicitis and gall-stones. Second, rare lesions of which few individual surgeons, or even large clinics, have experience should be collected from the literature for a critical review following the example of Brunner. We cannot thank this German surgeon for his splendid study of 380 gastric perforations and 86 duodenal perforations which have been reported between 1893 and 1903.

The Clinical History and Picture of Gastro-duodenal Perforations.—Perforation takes place in about 2 to 4 per cent. of gastric ulcers. Gastric perforations are by far most common in England and duodenal perforations in America. In proportion to the number of cases of gastric ulcer the perforation is more common in the male. Duodenal perforations are by far more frequent in the male. The age of the patients in gastric perforation has varied from 9 to 71 years, in duodenal perforations, from 20 to 64 years. Only one instance was recorded of perforation when the patient was resting quietly in bed under proper medical treatment, and one after gastro-enterostomy.

The symptoms of onset quite frequently are associated with meals. Why the majority are observed during the month of November cannot be explained.

Recent statistics demonstrate that the most common position for a simple ulcer is on the posterior wall of the stomach near the pylorus and near the lesser curvature. The majority of perforations, however, take place in the anterior wall, but also near the pylorus and lesser curvature. Perforation is possible in any position in which ulcers may form.

Duodenal perforations are most frequent on the anterior wall of the upper horizontal portion; they have, however, been observed in every part of the duodenum.

¹ Johns Hopkins Hosp. Bull., January, 1900, Case V, p. 7.

² Deutsche Ztschrft. f. Chir., 1903, Band lxi, p. 110.

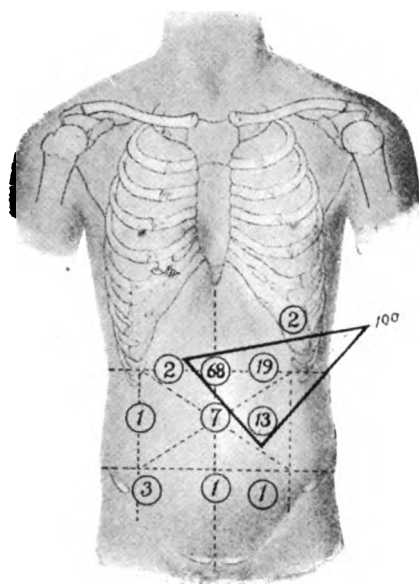


FIG. 23.—Areas of pain in perforation of gastric ulcer.

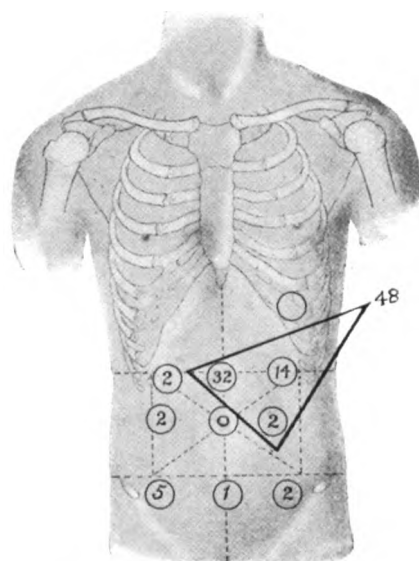


FIG. 24.—Areas of tenderness in perforation of gastric ulcer.

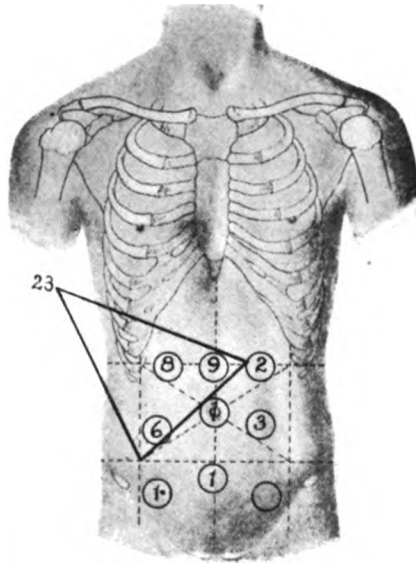


FIG. 25.—Areas of pain in perforation of duodenal ulcer.

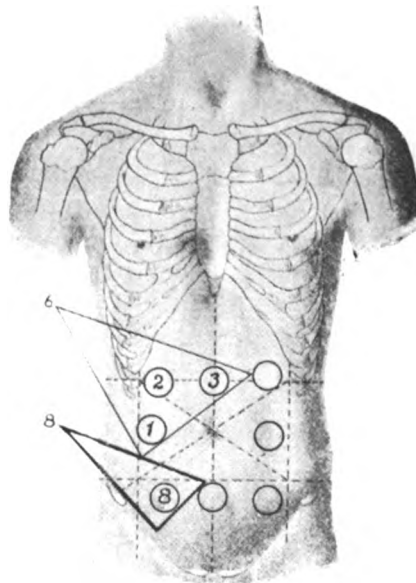


FIG. 26.—Areas of tenderness in perforation of duodenal ulcer.

Multiple ulcers were observed in 44 of 380 cases of gastric ulcer (11 per cent.), and in 19 of these cases there were two perforations.

Among 86 cases of duodenal perforations, in 16 there were multiple ulcers; in 3 the second ulcer was in the stomach, in 13 in the duodenum. There is no recorded example of multiple perforation.

In the great majority of cases there is a distinct previous history of ulcer. This was absent only in 19 among 286 gastric perforations (7.5 per cent.) and 11 among 61 duodenal perforations (20 per cent.). The possibility, therefore, of a perforation without a previous history must be borne in mind. But, as a rule, if the condition of the patient will allow, one will ascertain a pretty definite previous history of ulcer. This history will date back rarely weeks, frequently months, and often a few years, the longest two years. This fact is a very important one in the differential diagnosis.

Symptoms of Gastric Ulcer Perforation.—The symptoms are sudden and acute, in only three cases subacute. The intense pain is usually situated to the left of the epigastrium, rarely in other areas (Fig. 23). The pain is quickly associated with shock and collapse. Vomiting, although a common symptom, is not characteristic, and blood was observed in but 8 cases. At the examination the temperature and pulse are not characteristic. The rapid respiration is present, as in all acute abdominal lesions of the upper abdominal zone. At the examination local tenderness and muscle spasm are present over the area of pain (Fig. 24), and in the early hours the liver dulness may be partially or completely obliterated,—due to the escape of gas through the perforation. Diminution in liver dulness not associated with abdominal distention should be considered characteristic. Abdominal distention is a later symptom, and as it appears, muscle spasm disappears, and this sign indicates general peritonitis. Now and then movable dulness in the flanks, due to peritoneal exudate or the contents of the stomach, can be made out. As unusual symptoms, the apex beat of the heart may be displaced upward (noted in two cases). If auscultation is made, friction sounds or succussion may be elicited. A chill is rare.

These are symptoms present in the early hours (usually up to ten); the later symptoms are those of peritonitis and are not characteristic.

Symptoms of Duodenal Ulcer Perforation.—The symptoms of duodenal perforation only differ in the location of the pain, which is usually to the right, as shown in Fig. 25, and that the area of tenderness quite frequently is not in the locality of the pain, but in the right iliac fossa (Fig. 26). This is explained by the rapid gravitation from the duodenal perforation of the escaped fluid along the medial side of the

mesocolon to the cecum. This disassociation of the area of pain and tenderness should make one suspect a perforation of a duodenal ulcer rather than appendicitis.

Diagnosis.—To insure the best results an operation must be performed as quickly as possible. There are few recoveries after 12 hours. It is unnecessary to discuss at any length the differential diagnosis from other acute abdominal lesions, inflammatory in their character, because the presence of such symptoms would indicate an operation in any event. The clinical picture differs from acute pancreatitis in that local muscle spasm and tenderness are more marked in perforation, the intensity of the pain and the rapid collapse are very much alike. The previous history is different: in pancreatitis, as a rule, there is a free interval between the attack of epigastric pain and vomiting, while in the great majority of cases the previous history of ulcer is continuous. Perforations at the pylorus or at the duodenum might simulate a gangrenous or an infectious cholecystitis. The previous history of gall-stone colic differs as a rule from ulcer. The symptoms of a perforated appendix situated near the stomach might be confused with ulcer perforation. Confusion here, however, will do no harm; in all immediate operation is indicated. There are two conditions, however, in which the clinical picture might be mistaken for perforation, and in which operation is contraindicated: (1) Basal pneumonia or diaphragmatic pleurisy on the left side; this happened in four instances, with one death; (2) gastralgia associated with some neurosis. This mistake is shown by the fact that in 15 cases at the exploratory laparotomy one failed to find a perforation and, as far as an examination could indicate, no ulcer. In the latter cases, fortunately, there was no mortality.

Prognosis.—Fifty-two per cent. of gastric perforations and 20 per cent. of duodenal perforations recovered. Brunner's table demonstrates conclusively that the results depend more on early operative intervention than any other factor. Very few gastric perforations recovered after 36 hours, and no duodenal perforations after 20 hours.

Conclusions.—My own experience is meager. After reading Brunner's résumé one is impressed that the clinical picture in the majority of cases is so clear that the result would depend chiefly on the time at which the patient first came under observation and to operation. I am quite convinced that no one would allow delay, except that necessary to prepare for operative intervention.

Method of Operation.—Little difficulty is experienced in finding the perforation, and in those cases of early intervention, if the patient's condition allows, a gastro-enterostomy should be performed.

CARCINOMA AND CHRONIC ULCER OF THE STOMACH.—The present time is most opportune for a discussion of the recent and prospective progress in this chapter. All the large German clinics have published complete *résumés* of the entire experience of the clinic with the surgery of the stomach. Excellent, but not so numerous, contributions have appeared from French surgeons (Hartmann) and by Mayo Robson and Moynihan, in England, and in this country, by Mayo, of Rochester.

These publications have established the mortality, the post-operative complications, and the ultimate results. Although there is room for improvement in technic, we must in the future expect improvement in results to follow chiefly an earlier recognition and operative intervention. This is true both in ulcer and carcinoma.

The surgical experience of to-day should be forcibly brought to the attention not only of the general practitioner, but of the consulting physician. In the great majority of cases gastric lesions should immediately be given the benefit of exploratory laparotomy.

The ultimate results after operations for cancer of the stomach show that a new clinical picture must be established. The one now recognized as indicating malignant disease of the stomach is one associated with the late and usually hopeless stage of the disease. The clinician must not delay for such symptoms as tumor, absence of free hydrochloric acid, or the presence of lactic acid, emaciation, or cachexia. In individuals, especially men, after 30 years, an unexplainable loss of weight and strength, even without definite stomach symptoms, should be regarded with suspicion. When associated with even slight gastric abnormalities, the possibility of a malignant tumor is relatively great. This possibility increases when we are unable to ascertain any special cause for the indigestion and deterioration of general health, such as alcohol, tobacco, overwork, and errors in diet. Every case with a history of chronic ulcer should be given the benefit of operative intervention. The probability of a chronic gastric ulcer becoming a carcinoma varies from 5 to 20 per cent. according to various authorities. The change in the clinical picture is so insidious that a positive recognition can be made only at too late a stage in the disease.

Differential Diagnosis between Cancer and Ulcer.—In this field the surgeon and physician must work constantly together. The facts recently published demonstrate that a differential diagnosis is frequently impossible after a most careful clinical history and examination and analysis of the gastric secretion. On opening the abdomen, even the surgeon of great experience cannot always differentiate ulcer induration or tumor from carcinoma.

From the stand-point of the surgeon, after opening the abdomen if there is found a tumor or induration, which, on account of its adhesions, would indicate an inoperable condition, if the disease were malignant, a differential diagnosis is not necessary, and gastro-enterostomy is indicated. The ultimate result will make the diagnosis. In at least 2 per cent., probably more, of gastro-enterostomy or lesions of the stomach considered clinically and at the operation benign, the patients have died so quickly of carcinoma that its presence at the time of the operation cannot be doubted. In a few cases the later death from carcinoma might be explained by the secondary development of cancer in the chronic ulcer. We require more positive clinical methods of differential diagnosis and an improvement in our abilities to differentiate cancer from ulcer after exposing the lesion on opening the abdomen. In all cases of tumor or induration of the stomach which, when exposed, could be completely removed by excision, it would be the greatest comfort to the surgeon and benefit to the patient if one could depend with absolute assurance on the diagnosis of the clinician, and on the naked-eye conclusions from the examination of the exposed lesion. In carcinoma complete resection is indicated; in ulcer, gastro-enterostomy or Finney's gastroduodenostomy. The records of the experience of the world in surgery of the stomach demonstrate that we have not reached this stage of expert diagnosis.

Improvement must depend first upon the clinician's investigations in the chemical and physiologic analysis of the gastric secretion. Recent publications by Strauss¹ on clinical studies on the flow of gastric juice, and Gluzinski,² on the early diagnosis of carcinoma of the stomach, are good evidence that internal medicine is performing its part in this investigation. The surgeon must scrutinize more carefully and record his observations on the naked-eye appearances of doubtful cases. I am inclined to think that an exploratory incision into the tumor or induration is justifiable in these doubtful cases, and that in many we can differentiate the benign from the malignant. Perhaps further experience will demonstrate that in doubtful cases the area should always be excised. With improved technic and a patient in good condition, gastrectomy should have a mortality no greater than gastro-enterostomy.

ULTIMATE RESULTS AFTER OPERATIONS FOR BENIGN CONDITIONS OF THE STOMACH.—Mayo³ has published his experience with 168 cases,

¹ *Mittheilungen Grenzg. der Med. u. Chir.*, 1903, Band xii, p. 25.

² *Mittheilungen*, 1902, Band x, p. 1.

³ *Annals of Surgery*, vol. xxxviii, July, 1903, p. 44.

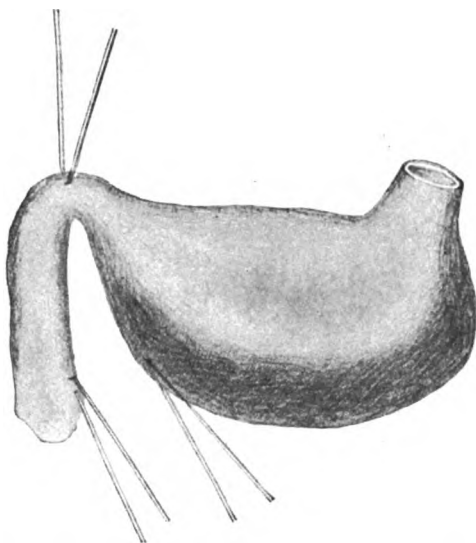


FIG. 27.—Illustrating the introduction of the primary sutures in the upper wall of the pylorus, the anterior wall of the stomach, and the anterior wall of the duodenum. These indicate the lower end of the gastric and duodenal incisions respectively. (Figs. 27 to 33 have been kindly lent by the editor of the Johns Hopkins Hospital Bulletin.)

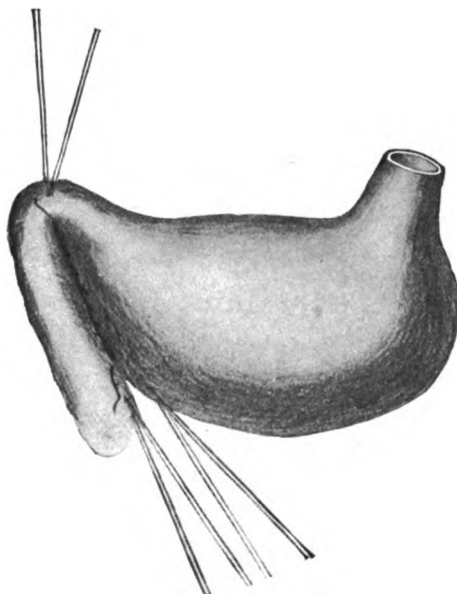


FIG. 28.—Illustrating the suturing together of the peritoneal surfaces of the duodenum and stomach along the greater curvature as far posteriorly as possible.

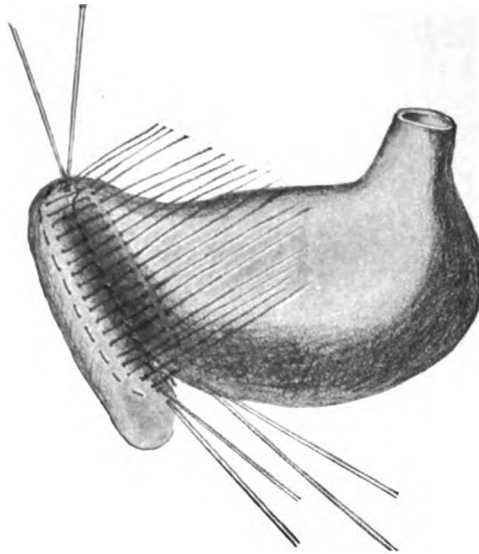


FIG. 29.—Illustrating the anterior row of mattress sutures—not tied, but left long.

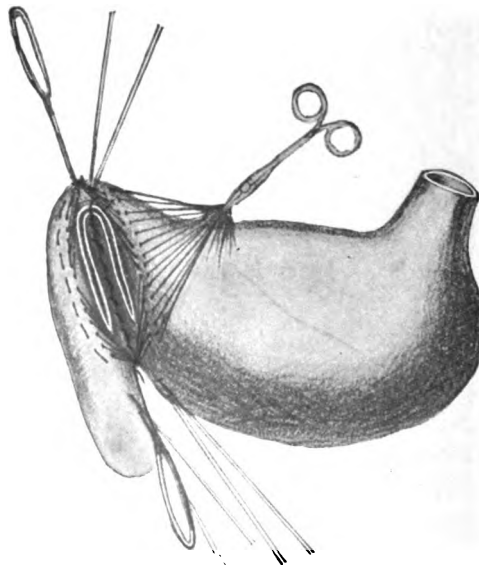


FIG. 30.—Illustrating the retraction vertically of the row of mattress sutures, the horse-shoe incision in the duodenum and stomach, and the tissue excised.

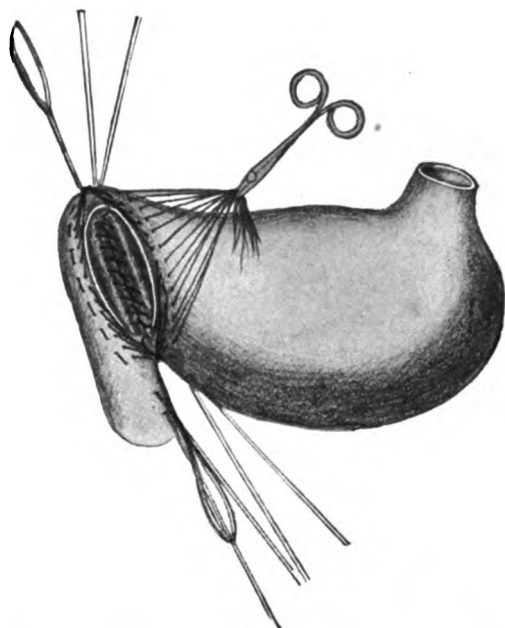


FIG. 31.—Illustrating the introduction of the continuous catgut suture through all the coats of the intestine on the posterior side of the incision.

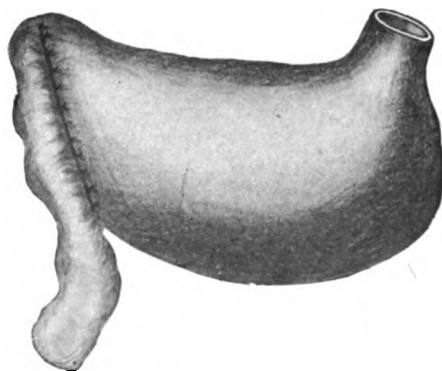


FIG. 32.—Illustrating the operation completed.

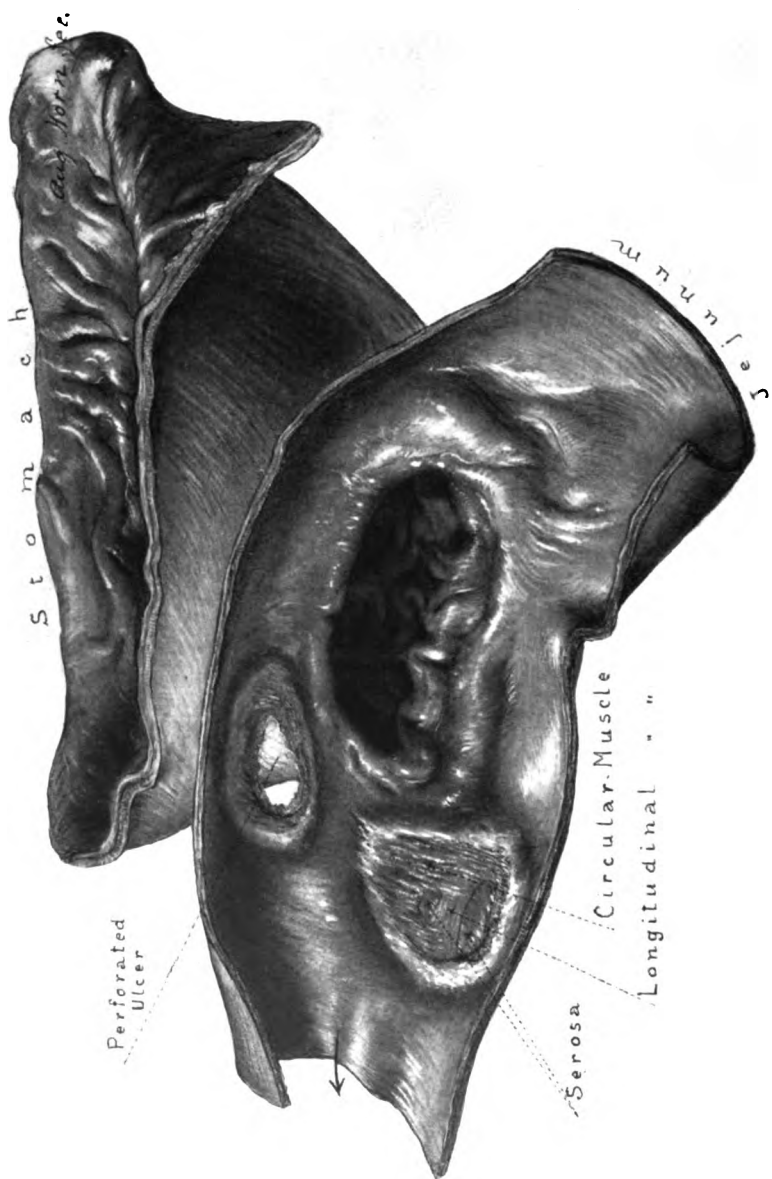


FIG. 33.—Watt's case of peptic ulcer after gastroenterostomy.

in which there were but 11 deaths, a mortality of but 6.5 per cent. Peterson and Machol¹ give the entire experience of Czerny's clinic in Heidelberg,—104 cases with a total of 120 operations, 11 deaths, about 10 per cent. Stich² gives a *résumé* of the ultimate results of all published operations for benign lesions of the stomach. The mortality of gastro-enterostomy, 372 cases, is but 12 per cent., while that for plastic operations on the pylorus, 44 cases, is 16 per cent., and the mortality for resection, 21 cases, is 34 per cent. These figures demonstrate that for ulcer gastro-enterostomy is the operation of choice. In addition the study of the ultimate results by Rencki³ clearly proves that gastro-enterostomy, properly performed, insures a more permanent result than the usual plastic operations on the pylorus or local excision of the ulcer. I am inclined to think that Finney's method of gastroduodenostomy⁴ will have an equally small or less mortality than gastro-enterostomy; and that the permanent results will be as good or better. So far peptic ulcer of the jejunum has not been observed after Finney's operation, the technic of which is well illustrated by Figs. 27, 28, 29, 30, 31, and 32.⁵

PEPTIC ULCER OF THE JEJUNUM.—Brodnitz⁶ collects 15 cases from the literature, almost 4 per cent. It has been observed only after gastro-enterostomy for benign gastric lesions—twelve times when the anterior method was employed, twice after the posterior, and once after Roux's operation. Fig. 33 illustrates a peptic ulcer observed by Watts⁷ after a gastro-enterostomy on a dog.

ULTIMATE RESULTS AFTER OPERATION FOR CARCINOMA OF THE STOMACH.—The pathetic picture is best presented by Schönholzer⁸ in his study of all the cases of carcinoma of the stomach in Krönlein's clinic in Zürich. Among 264 cases observed since 1881, in 67 no operation was performed; in 53, because the condition was considered inoperable; in 14 the patients refused operation. In 73 cases the tumor was found to be inoperable after exploratory laparotomy. In 74 cases gastro-enterostomy was done, as the condition was considered to be beyond the possibility of complete removal. In only 50 cases (less

¹ Beiträge zur klin. Chir., 1903, Band xxxiii, p. 297.

² Beiträge zur klin. Chir., 1903, Band xl, p. 342.

³ Mittheilungen aus den Grenzgebieten, 1901, Band viii, p. 291.

⁴ Johns Hopkins Hosp. Bull., 1902, vol. xiii, p. 155.

⁵ We are much indebted to the editor of the Johns Hopkins Hospital Bulletin for the use of the cuts of Figs. 27 to 33.

⁶ Proceedings of the German Surgical Congress of 1903, p. 77.

⁷ Johns Hopkins Hosp. Bull., July, 1903, vol. xiv, p. 191.

⁸ Beiträge zur klin. Chir., 1903, Band xxxix, p. 162.

than 20 per cent.) was gastrectomy performed. Of these 50 patients, only 2 have remained free from disease longer than three years. Schönholzer attributes these unsatisfactory results to three factors: "x," the period during which the carcinoma of the stomach is latent; "a," the time during which the patient waits before seeking advice of the physician; and "b," the time during which the patient is under medical treatment. In the 214 cases considered inoperable, in which no operation, or exploratory laparotomy, or gastro-enterostomy was done, the average duration of the disease was 9 months. During this time these patients were under medical treatment on an average of 6 months; only 27 of the 214 patients were immediately given the benefit of surgical treatment after the physician's examination. In the 50 cases in which gastrectomy was performed, 11 were immediately transferred from the medical clinic; in the others the average duration of the disease was 6 months, medical treatment 3 months. Petersen¹ undoubtedly contributes the best pathologic study of gastric carcinoma. The clinical results in the Heidelberg clinic of Czerny are somewhat better; 57 gastrectomies, 30 over three years, 7 living (23 per cent. of the operable cases).

The hope of progress in permanent results in carcinoma of the stomach depends, therefore, more on early recognition than operative technic.

As estimated by Stich,² the mortality of the published cases of operations for carcinoma of the stomach during the last 23 years is as follows: Exploratory laparotomy 11 per cent. (136 cases); gastro-enterostomy 39 per cent. (709 cases); gastrectomy 42 per cent. (422 cases).

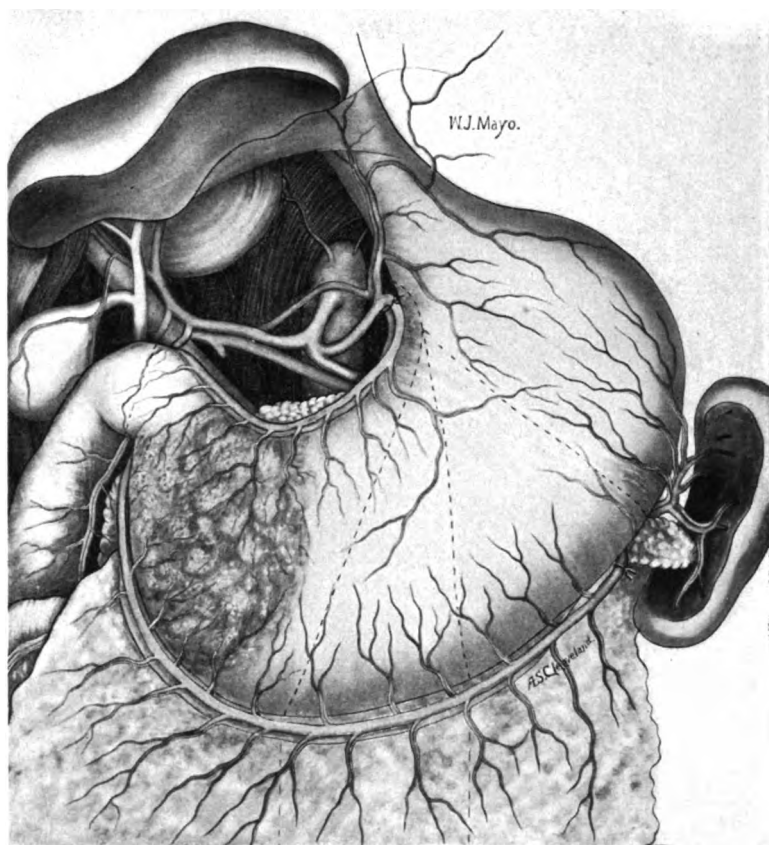
The mortality in recent years is very much less. As pointed out by Petersen,³ every case of carcinoma of the stomach should be given the benefit of gastrectomy. The present mortality with improved technic should not be any more than from gastro-enterostomy. Of course, it is the only operation which gives any promise of a cure. Even if this is not accomplished, it promises a longer duration of life and greater comfort.

METHODS OF GASTRECTOMY.—The study of the ultimate results and the pathologic investigations, especially those of Petersen, demonstrate that a larger area of the stomach and duodenum should be removed with the tumor. This is best illustrated in Figs. 34 and 35, taken from Mayo's recent publications; that is, Billroth's original

¹ Transactions of XXXII German Surgical Congress, 1903, p. 64.

² Loc. cit.

³ Loc. cit.



Hartmann.

Mikulicz.

Robson,
Moynihan,
Mayo.

FIG. 34.—Lines of incision practised by different surgeons in the removal of cancer of the stomach.

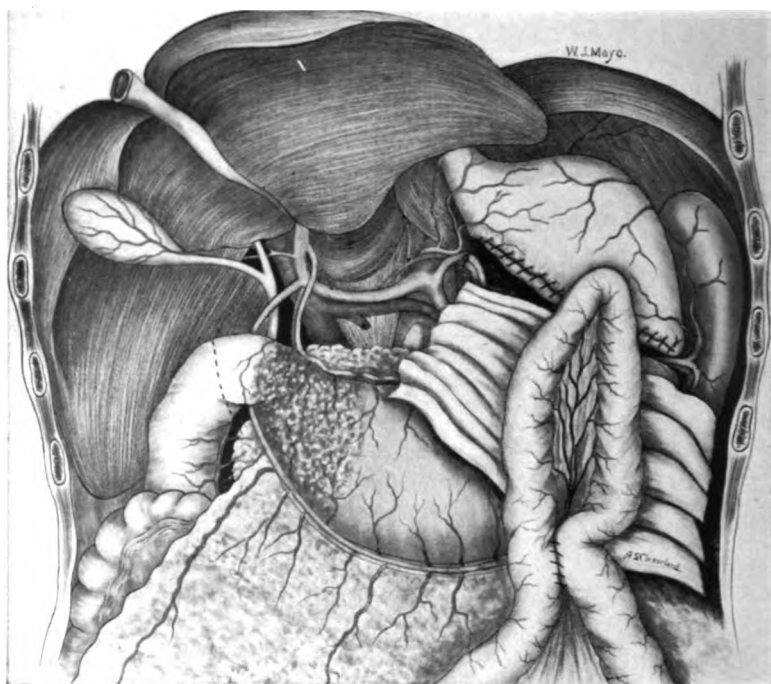


FIG. 35.—The completed operation for cancer of the stomach. (W. J. Mayo.)

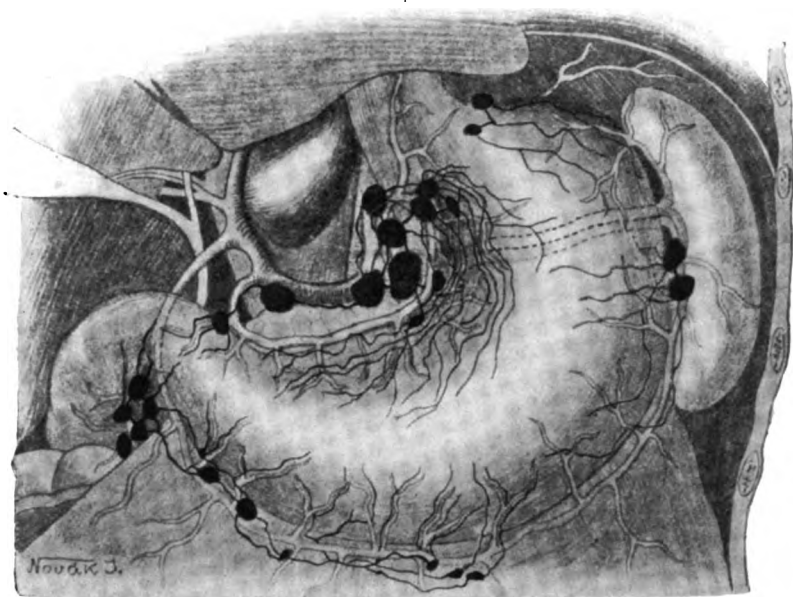


FIG. 36.—The position and number of the lymphatic glands that may be involved in metastasis from gastric carcinoma, anterior view. (Polya and Navratil.)

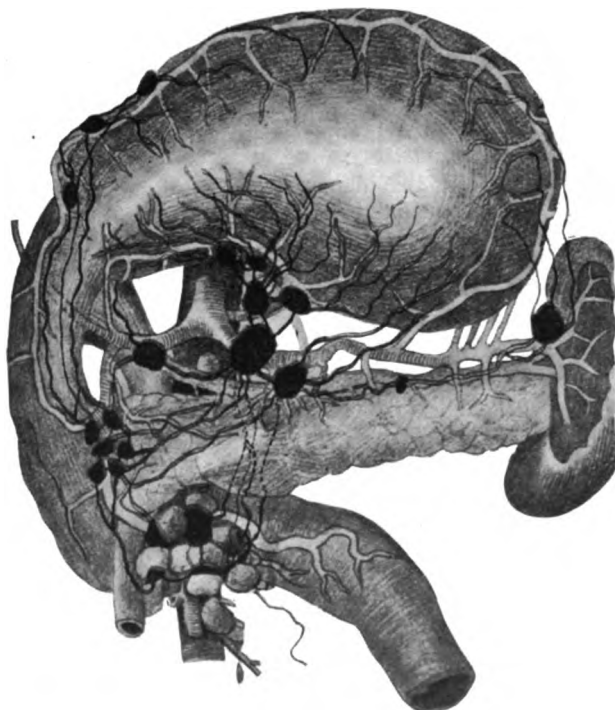


FIG. 37.—The position and number of the lymphatic glands that may be involved in metastasis from gastric carcinoma, posterior view. (Polya and Navratil.)

method in which, after the resection, the duodenum was united with the stomach end to end, should be given up, and Billroth's second method, in which, after a larger resection of both stomach and duodenum, the resected ends are closed, and a gastrojejunostomy performed, should be followed in the majority of cases.

Petersen's pathologic study agrees with Ribbert's theory that carcinoma of the mucous membrane is unicentric in origin, and for this reason in its early stage is a local disease, and curable by complete removal; that carcinoma of the stomach in its further growth has a greater tendency to infiltrate within the wall of the stomach and duodenum than to perforate or give metastasis to regional lymphatic glands. For this reason, according to Petersen, the most important factor in the operative technic is removal of more stomach and more duodenum. He also claims that the mortality of complete removal of all the lymphatic glands is from 40 to 60 per cent., while in the less extensive gland operation it is only 17 per cent. Petersen's examinations of the lymphatic glands demonstrate that the probabilities of metastases are less than the dangers of their complete removal, and for this reason advocates a less extensive operation. Petersen's conclusions are by no means confirmed. Against his conclusions are the recent investigations on the lymphatics of the stomach by Polya and Navratil.¹ The position and number of the lymphatic glands which may be involved in metastasis from gastric carcinoma are beautifully pictured by these investigators in Fig. 36 (anterior view) and Fig. 37 (posterior view). This problem can only be settled by further clinical and pathologic investigation.

THE TREATMENT OF GASTRIC NEUROSES.—These cases are frequently very difficult to differentiate clinically from organic lesions of the stomach. Not improbably, in order not to allow an organic lesion to get beyond operative relief, such cases will be subjected to exploratory laparotomy. Recent experience has demonstrated (Mayo and others) that after excluding an organic lesion the abdomen should be closed. Gastro-enterostomy is unnecessary and may aggravate the condition.

SURGERY OF THE PANCREAS

The chief progress in the surgery of the pancreas has been more a diffusion of knowledge than an actual improvement in results. On account of the comparative rarity of the surgical lesion, this chapter on abdominal surgery illustrates the importance of keeping abreast with recent literature, in order to recognize and properly treat one of these

¹ *Deutsche Ztschrft. f. Chir.*, 1903, Band *lxix*, p. 421.

VOL. I. Ser. 14—17

diseases when chance, perhaps for the first time, brings it under observation.

The most interesting problem is the early recognition and treatment of the acute inflammations of the pancreas, a problem by no means settled. Von Mikulicz,¹ of Breslau, in his paper before the last Congress of American Physicians and Surgeons, states that this chapter "is still the most incomplete in the realm of abdominal surgery," and that "the personal experience of each surgeon is only small, and a comprehensive report must rest in a great measure upon the observations of others."

It is gratifying to read that Mikulicz gives the chief credit for the advancement in our knowledge of pancreatic diseases to the efforts of American pathologists and surgeons.

ACUTE PANCREATITIS.—For clinical purposes we may divide the cases into two groups. The first is characterized pathologically by an enlarged and swollen pancreas due to an exudate of serum and blood into the pancreas and peripancreatic tissue. The pancreas may show various degrees of necrosis. These lesions are usually associated with disseminated areas of fat necrosis in the abdomen and an intraperitoneal hemorrhagic exudate. In the second group, suppuration with the formation of one or more abscesses has taken place, and usually there is more or less gangrene of the pancreas.

With few exceptions each group has a definite clinical picture.

In January, 1902,² I made a careful study of all the published cases of acute pancreatitis, and recently, for the purposes of teaching, I have completed the subject up to the present time.³

Acute Pancreatitis, First Group.—The cases in the literature allow the following classification of those cases of pancreatitis which have not proceeded to suppuration.

1. Acute pancreatitis, recovery.

A. Diagnosis based on clinical picture, no operation	3 cases.
B. Diagnosis based on passage of necrotic pancreas per rectum	2 "
C. Diagnosis confirmed by later autopsy after re- covery from attack	2 "
D. Diagnosis based on operation after recovery from acute attack, but before abscess formation ...	5 "
E. Recovery after operation during acute attack	13 "

¹ Transactions of the Congr. of Amer. Physicians and Surgeons, vol. vi, 1903, p. 65.

² Unpublished paper read before the New York State Medical Society in Albany.

³ Pamphlet on Diseases of the Pancreas, Johns Hopkins Hospital Library, unpublished.

2. Acute pancreatitis, death.

A. No operation	27 cases.
B. Operation during acute stage	23 "

The mortality of acute pancreatitis without abscess formation is about 66 per cent. However, we must recollect that every case of pancreatic abscess undoubtedly passes through, at least pathologically, the first stage of the disease, and for this reason should be considered among the recoveries from the first stage of acute pancreatitis. Among about 35 cases of pancreatic abscess in the literature, at least 30 per cent. exhibited in the early days of the disease the typical clinical picture of the first stage of acute pancreatitis from which they recovered. The symptoms of abscess followed in some instances immediately, in other cases there was a free, or partly free, interval before the definite signs of suppuration appeared. There is no question in regard to the treatment of pancreatic abscess, and that incision and drainage should be performed at once. But there is a question as to the feasibility of operation during the first two or three days of the first stage when the individual is critically ill and often in collapse. Mikulicz¹ advances the view that the first stage of pancreatitis should be treated as any other phlegmon, and that the moment the condition is recognized the abdomen should be opened and the peripancreatic inflamed tissue and the pancreas itself incised and drained. George Woolsey,² of New York, in the most recent paper, takes the same stand. Mikulicz, however, states that many surgeons are averse to operation. I took this position in my paper in January, 1902.³ Woolsey writes: "The argument (of Bloodgood) appears to me to be entirely fallacious." At that time I could not get a single fact that seemed to me to justify operation, except the difficulty, in some cases, of excluding an abdominal lesion which demanded immediate operation; for example, perforations of gastric and duodenal ulcer, gangrenous or suppurative cholecystitis, or appendicitis in which the local symptoms, on account of the position of the appendix, were in the epigastrium. Recent cases observed since this paper was written impress me that Mikulicz and Woolsey may be right, but the problem, as Mikulicz agreed, is by no means settled. The facts, now, are as follows:

There is no doubt that a number of cases of acute pancreatitis recover from the acute attack, and that the lesion does not go on to

¹ Loc. cit.

² *Annals of Surgery*, vol. xxxviii, November, 1903, p. 726.

³ Loc. cit.

suppuration. In the 12 cases noted in group 1 (A, B, C, and D), the patients exhibited clinical symptoms just as typical and critical as the 13 patients who recovered after operation, (E), or the 50 patients who succumbed in the first stage. It must be conceded, as will be discussed later, that in a number of the 13 cases which recovered after operation, the patients had in fact recovered from the acute stage, and it is quite possible that the later operation (after the third day) had nothing to do with the ultimate recovery.

Acute Pancreatitis, First Stage; Recovery without Operation.—The patients reported by Zeller,¹ Brentano,² and Jacob³ were critically ill and in collapse. The acute symptoms lasted 48 hours.

The two cases reported by Chiari⁴ in 1862 and 1879, in which the diagnosis was confirmed by the passage of the necrotic pancreas per rectum, are unique. In Schmidtman⁵ and Benda,⁶ the diagnosis was confirmed at the autopsy after recovery from the acute attack. I have knowledge of 5 cases in which the accuracy of the diagnosis was confirmed by a subsequent operation. One was reported by Batchelor,⁷ one by Rasumowski,⁸ one by Langton,⁹ one was observed in Dr. Halsted's clinic in the Johns Hopkins Hospital, and I saw a patient in October, 1901, in consultation with Dr. McKenzie, of Portland, Oregon. These patients demonstrate the possibility of recovery from the first stage of acute pancreatitis, even though the patients be very ill and in collapse. They also confirm Mikulicz's view that when we operate, the pancreas should be incised and drained. The three patients (Batchelor, Rasumowski, Langton) in whom this was done recovered; the two in which the pancreas was not explored died.

Acute Pancreatitis, First Stage; Operation; Recovery (13 cases).—These observations require a critical review, because, as stated before, some of them cannot be considered operations during the early days of the acute stage; in some we cannot attribute the recovery of the pancreatitis to the operation, because the area of the pancreas was not drained.

In 4 cases the operation was performed within 48 hours; in 1 on

¹ Centralblatt f. Chir., 1901, vol. xxviii, p. 2.

² Centralblatt f. Chir., 1901, Band xxviii, p. 22.

³ British Medical Journal, 1900, June 23.

⁴ Wiener med. Wochenschrift, 1876, p. 292, and 1880, p. 39.

⁵ Centralblatt f. Chir., 1901, p. 390.

⁶ Centralblatt f. innere Medicin, 1895, p. 161.

⁷ Medical News, August 9, 1902.

⁸ Archiv. f. klin. Chir., 1899, Band lix, p. 565.

⁹ Lancet, 1898, vol. ii, p. 1633.

the third day; in 5 between the sixth and thirteenth day; in 4 the time is not stated. These figures should be compared with those in acute pancreatitis which did not recover from the first stage; in 27 cases in which no operation was performed, 2 patients died within 24 hours; 8 within 48 hours; 6 on the third day; 1 on the fourth; 2 on the fifth; 1 on the seventh; in the remaining cases the time is not stated. In the 23 cases which died and in which an operation was performed, in only 5 cases was operative intervention instituted after the third day. In these instances, 4 operations took place on the fifth and sixth day and one on the fourteenth day.

These figures indicate that after the third day the prognosis for recovery with or without operation is very much better. For this reason it is questionable whether in cases which have recovered and in which the operation has been performed between the sixth and thirteenth day, the result should be attributed entirely to the operation.

METHODS OF OPERATION.—In one case, operated by Henle, in Mikulicz's clinic,¹ the peritoneal exudate was evacuated and an artificial anus established in the cecum to relieve intestinal paralysis. The time of operative intervention is not stated.

In two cases the peritoneal exudate was evacuated and the wound closed: in Halsted's case 40 hours after onset; and in the one reported by Pels-Leusden² on the thirteenth day. Halsted's patient has been observed up to the present time (January, 1904), 14 years,³ and Pels-Leusden's patient three years; both have remained well and free from subsequent attacks.

Evacuation of peritoneal exudate and drainage without incision of the peripancreatic or pancreatic tissue was employed in 4 cases. Hahn,⁴ under light chloroform narcosis, simply opened the abdomen, let out the fluid, and drained. His patient was very ill, practically in collapse 48 hours after the onset. Woolsey's second patient had been ill but 12 hours, and represents the earliest operative intervention. In his second case, the operation was performed on the third day. In Pels-Leusden's second case of recovery the operation was performed on the seventh day.

In two cases, on account of the presence of gall-stones and cholecys-

¹ Mentioned by v. Mikulicz, loc. cit.

² Deutsche Ztschrft. f. Chir., 1903, Band lxx, p. 183.

³ Due to a mistake by Körte in his original monograph in the Deutsche Chirurgie; it is stated that this patient had a subsequent attack. This incorrect fact has been quoted in all the recent publications, and should be corrected.

⁴ Deutsche Ztschrft. f. Chir., 1901, Band lvii, p. 5, Case III.

titis, cholecystostomy only was performed by Beck¹ on the sixth day, and by Mayo² on the seventh day.

Lund³ drained on the seventh day a hemorrhagic and necrotic peripancreatic fat cavity. His patient, however, unfortunately died 8 weeks later from an erosion hemorrhage of an artery in the splenic flexure of the mesocolon. The cause of death was similar to that in Finney's case, in which the pancreas was not drained. Lund's patient was apparently over the very acute symptoms, but was not in as good a condition as the patients of Batchelor, Rasumowski, and Langton, on whom the operative interventions were about identical.

In the cases observed by Fowler,⁴ Hotchkiss,⁵ and Bevan⁶ (2 cases) the method of operation is not given.

C. B. Porter,⁷ of Boston, appears to be first to anticipate the suggestion brought out by Mikulicz in his paper before the Congress in May, 1903. Porter's patient was admitted 48 hours after the acute onset. The patient was in great pain and vomiting continuously. There was some distention, chiefly in the epigastrium; leukocytes, 8000. A clinical diagnosis of intestinal obstruction was made. On opening the abdomen, all the lesions of the diffuse hemorrhagic pancreatitis with fat necrosis were present. A second incision was made along the left costal margin. The pancreas was exposed through the mesentery of the transverse colon. It was "very large, tense, edematous, and of a deep purplish color." An incision four inches long and three-quarters of an inch deep was made through the peripancreatic tissue from the tail to the head of the pancreas. Tube and gauze drainage were introduced. The wound healed rapidly by granulation, and only two pieces of gangrenous fat were discharged. The operation, therefore, performed by Porter was more extensive, and was done in the very earliest stage of the acute pancreatitis. The recovery from this operation was rapid. At the end of two months, however, the patient began to complain of persistent localized pain in the epigastrium, and an operation was performed on the view that a stone might still be present in the common duct. On opening the abdomen no stones were found. The induration of the pancreas had entirely disappeared except a small area in the head. Further exploration demon-

¹ Jour. Amer. Med. Assoc., November 2, 1902.

² Jour. Amer. Med. Assoc., January 11, 1902, p. 107.

³ Med. and Surg. Reports of Boston City Hospital, May, 1900, p. 50.

⁴ Transactions of Amer. Med. Assoc., 1901, vol. xix, p. 179.

⁵ Annals of Surgery, October, 1903, xxxviii, p. 604.

⁶ Mentioned by Woolsey, already quoted.

⁷ Reported by Mikulicz, loc. cit., p. 76.

strated a small cavity in this area of induration filled with necrotic tissue (cultures sterile). The wound was closed with drainage into this cavity. Following the second operation the patient was relieved of the epigastric pain. This second operation in Porter's case corresponds, therefore, with the 5 previously mentioned in which the operation was performed after the acute symptoms of the attack had subsided, and the patients exhibited what we may call the residual symptoms of non-suppurative acute pancreatitis: localized epigastric pain and resistance. In Porter's case, therefore, the early operation did not insure his patient from a second laparotomy.

Conclusions as to Treatment of the First Stage of Pancreatitis.—I do not feel prepared from the available facts to venture any positive statements in regard to what procedures will give the best results. Should the surgeon see the patient after the third day there seems to be little doubt that immediate operation is indicated, and one should not be content with anything less than exploration and drainage of the peripancreatic fat and any hemorrhagic or necrotic cavity, if found in the pancreas itself. If the condition of the patient justifies it, a careful exploration should be made both for gall-stones and pancreatic calculi. It appears to me, from the results already obtained, that this exploration and drainage should be done by exposing the pancreas between the stomach and colon. When the patient is seen in the early hours or days, and the symptoms are associated with critical collapse, it would appear, as advocated by von Mikulicz and Hahn, that the better procedure would consist of an exploratory incision in the median line, if possible, under cocain anesthesia, the evacuation of the blood-stained exudate, and gauze drainage to the region of the pancreas. Should the patient react and the symptoms be not entirely relieved, a second operation could then be performed with more extensive exploration and drainage of the pancreatic inflammation. When the pancreatitis is associated with gall-stones and cholecystitis, cholecystostomy is indicated at the first operation.

From the description of the abdominal findings in the cases so far reported, I am inclined to the opinion that in many the moment the peritoneal cavity is opened, the diagnosis can be made. The blood-stained exudate without evidence of mechanical obstruction and the disseminated fat necrosis are pathognomonic. Finding this the operator could stop, but it must be borne in mind that in quite a few cases considerable exploration, more manipulations of the intestines than can be done under local anesthesia will be required. Here light anesthesia would be justifiable for the further exploration.

Symptoms of Acute Pancreatitis, First Stage.—One is surprised

at the frequency with which a clinical diagnosis of intestinal obstruction is made. When I compare the composite clinical picture of these 75 cases of acute pancreatitis with the cases of intestinal obstruction which I have observed, I cannot see the resemblance. The pain in pancreatitis is more intense, except as compared with a few cases of strangulation of the intestines by a band; the pain in pancreatitis is localized in the epigastrium, while in obstruction it is rarely in this area; in pancreatitis symptoms of intense toxemia are much earlier than in obstruction; in the early hours of obstruction the leukocytosis rises to from 20,000 to 30,000. In Porter's case, 48 hours after the onset the leukocytes were 8000; in Woolsey's Case II, 12 hours after onset, 17,000. That there may be a leukocytosis, however, in pancreatitis is illustrated by his first case observed at the end of the third day (39,000). In obstruction, except high in the jejunum or duodenum, distention is symmetrical, and is associated, as a rule, with no muscle spasm at all, or with slight rigidity of all the abdominal muscles; in pancreatitis the distention is first most marked in the epigastrium, and is here associated with rigidity. In pancreatitis, on account of the diffuse enlargement of the pancreas, the tympanitic note in the lower half of the epigastrium and the upper half of the umbilical area is usually less tympanitic or flat, in some cases dull, while in obstruction this is, as a rule, the most tympanitic area in the abdomen. Many of the cases of pancreatitis give a previous history of similar attacks, or definite gall-stone colic, some with jaundice and the passage of stones.

I am inclined to think now, after so much has been published on acute pancreatitis, that physicians will always consider this possibility in their differential diagnosis of acute abdominal lesions. When they see acute pancreatitis for the first time they will be impressed from the symptoms that the clinical picture is something new and different from anything else previously observed.

Acute Pancreatitis, Second Stage (Pancreatic Abscess).—I have not as yet had the opportunity to give this group of cases the same consideration as the previous. The diagnosis apparently is easier, the indications for operation clearer. So far in the literature there are 11 recoveries after operation and 24 deaths. Not a single case of recovery without operation.

Clinically, pancreatic abscess should not, with our present knowledge, be difficult to recognize. The prominent symptoms are epigastric pain and tumor (Figs. 38 and 39), and the general appearance of a grave infection. In addition to fever and leukocytosis, there is usually a delirium which we seldom see in other abdominal abscesses. In the three cases which I have observed the delirium has impressed me as a

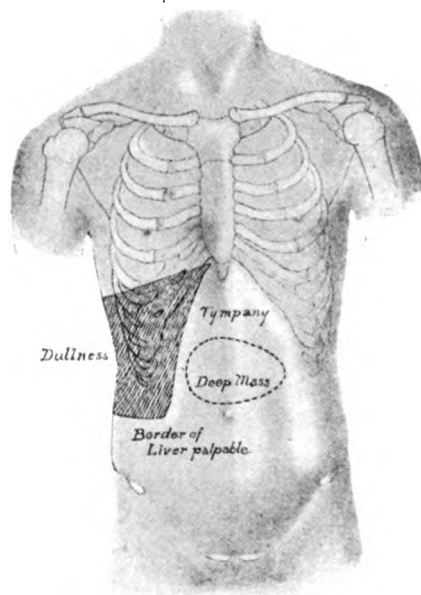


FIG. 38.—The abdominal findings in a case of pancreatic abscess.

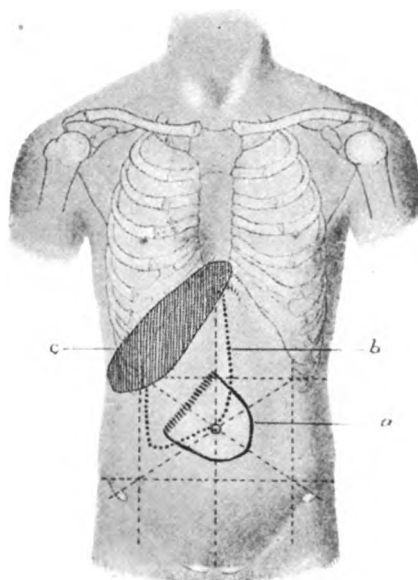


FIG. 39.—The abdominal findings in a case of pancreatic abscess. *a.* Palpable tumor (—).
b. Visible tumor (...). *c.* Liver dullness (shaded).

characteristic sign. The delirium may be described as that observed in typhoid infection. Most of the cases give a history of previous attacks, in some only epigastric pain and nausea, in others typical gall-stone attacks, with or without jaundice. In about 30 per cent. of cases the present attack, in the first few days, resembles acute hemorrhagic pancreatitis which we have described; the symptoms of abscess may supervene without a free interval. In other cases the attack from the onset is subacute, in a few chronic.

In 5 of 11 cases which recovered, the operation was performed between the ninth and fifteenth day; in the remainder, all more chronic cases, between one and ten months after the onset of symptoms.

The first recovery by operation was reported by Thayer.¹ The operation was performed by Finney. There had been a previous history of epigastric pain with morning nausea for some years. The present attack of epigastric pain and vomiting, followed by tumor, fever, and delirium, had been present ten days. The abdominal findings are well illustrated in the chart which I made at that time (Fig. 38). This area in the lower epigastrium and upper umbilical region usually feels like a doughy mass, dull or impaired tympany on percussion; it was definitely located in 7 of these 11 cases. In Brentano's case,² the tumor occupied the splenic area and was diagnosed a left subphrenic abscess. In Swierzewski's,³ the area of dulness and induration was perinephritic, and diagnosed pyonephrosis.

In the 10 cases which did not recover after operation, the fault in the majority was not with the delay in the operation. In all of the cases the attack was acute, like hemorrhagic pancreatitis. In the majority, the operation was performed between the third and fourteenth day. In a case of my own observation, I believe an earlier operation might have effected a different result. This patient was admitted to the surgical clinic on the twenty-first day of the disease. In the first three or four days of the attack the acute symptoms and collapse indicated acute hemorrhagic pancreatitis. A tumor was observed on the seventh day. On admission to the surgical clinic the patient was critically ill; fever, leukocytosis, delirium; the abdominal findings are well illustrated in Fig. 39. Although the abscess was opened without difficulty under cocaine anesthesia, the patient died in 24 hours.⁴ At the autopsy, Opie⁵ found a perfectly drained abscess, no peritonitis,

¹ Amer. Jour. Med. Sciences, October, 1895.

² Archiv f. klin. Chir., Band lxi, Heft 4.

³ Jahresberichte, 1899, Band v, p. 725.

⁴ Johns Hopkins Hosp. Bull., January, 1901.

⁵ Amer. Jour. Med. Sciences, January, 1901.

a necrotic pancreas, and a small stone in the diverticulum of Vater, that is, his findings were similar to those in the case reported by Halsted,¹ except in the latter case the patient succumbed to the disease in the acute period before abscess formation.

In the 14 cases of pancreatic abscess which died without operation, the patients exhibited the various clinical pictures: acute, subacute, and chronic. They were first observed between 24 hours and 3 months after the beginning of the attack. In the majority of these cases, with our present knowledge, a diagnosis could have been made, at least one to indicate immediate operation. These patients died from three days to six weeks after their first examination; one patient, first observed 24 hours after the attack, died in the medical clinic six weeks later. In another case the gall-bladder was drained for stones, but the pancreatic abscess was overlooked. Undoubtedly in this group an immediate operative intervention would have increased our number of recoveries.

TREATMENT

BY A. A. STEVENS, M.D.

Lecturer on Physical Diagnosis in the University of Pennsylvania; Visiting Physician to the Episcopal and St. Agnes's Hospitals, Philadelphia

INFECTIOUS DISEASES

TYPHOID FEVER

WHILE no consensus of opinion has yet been reached as to the efficacy of *alcohol in acute infections*, there is a growing tendency in the profession to use the drug with a greater degree of caution. J. H. Musser² states that for moral reasons and because of the doubtful results he employs *alcohol in typhoid fever* less and less. He is convinced that more of his patients with typhoid fever recover than ever before, and attributes this decrease in mortality not alone to the use of hydrotherapy, but also to the withholding of alcohol in a large proportion of the cases. He believes that the chief indication for alcohol is marked toxemia, especially in elderly patients. In the young, when there are septicemic changes, he prefers to give the drug in very small amounts, using large doses only for short periods.

¹ Johns Hopkins Hosp. Bull., April, May, June, 1901.

² Jour. Amer. Med. Assoc., December 5, 1903.

H. A. Hare,¹ in a preliminary communication upon *the effect of alcohol on the bacteriolytic power of the blood*, concludes from experimental research that alcohol seems to have the power of combating infectious diseases by increasing the bacteria-destroying power of the blood; and that while the experiments so far made are too few to be conclusive, they indicate that this effect is produced, to some extent at least, by an increase in complement.

Intestinal antiseptics continue to be advocated in the treatment of *typhoid fever*, notwithstanding the fact that the disease is a general and not an intestinal infection. The most cursory study of the bacteriology of typhoid fever should be sufficient to convince any one that the general course of the disease cannot be materially affected by the use of any intestinal antiseptic, no matter how free it may be from toxic properties.

F. G. Harris² reports 128 cases of *typhoid fever treated with acetozone*. The mortality was 8.59 per cent. The average stay in the hospital was 28 days. Woods and Thrush³ report 53 cases of typhoid fever treated in the Presbyterian Hospital, Philadelphia, in which acetozone was used. There were no deaths in this series. Billingslea⁴ also reports 25 cases of typhoid fever treated with acetozone without a death.

A. E. Wright⁵ publishes two new statistical reports from the British War Office with reference to the results of *antityphoid inoculation* in the army in India and Africa. Of 55,955 uninoculated soldiers in India, 744 contracted typhoid fever and 199 died, an incidence rate of 1.33 and a death-rate of 0.36. Of 4883 inoculated against the disease, only 32 contracted it, with 3 deaths, an incidence rate of 0.66 and a death-rate of 0.06, the former being decreased by one-half and the latter by five-sixths. Of 10,981 uninoculated soldiers in Africa, 257 contracted the disease, an incidence rate of 2.3. Of 2535 inoculated, only 26 had typhoid fever, an incidence rate of 1 and a diminution of more than one-half.

A. Macfadyan,⁶ having demonstrated by experimentation that the *specific toxin of typhoid bacilli* is intracellular and not extracellular, has obtained from typhoid bacilli, by disintegrating them in liquid air, a toxin which on inoculation into animals in small doses invariably proves toxic or fatal. He has also found that the injection of the toxin

¹ Therapeutic Gazette, May 15, 1903.

² Therapeutic Gazette, March 15, 1903.

³ Therapeutic Gazette, June 15, 1903.

⁴ Atlanta Journal-Record of Medicine, February, 1903.

⁵ British Medical Journal, October 10, 1903.

⁶ British Medical Journal, March 21, 1903.

into monkeys renders the blood-serum of those animals both antitoxic and bactericidal; and, further, that if an animal inoculated with a lethal dose of living bacteria were, after half the time had elapsed necessary to bring about death, injected with the serum, it recovered. A. E. Wright¹ contends that there is nothing novel in the vaccine devised by Macfadyan except that it is prepared with liquid air, and that those engaged in medical research must emphasize in season and out of season that there is absolutely no outlook for the successful practical exploitation of an antitoxic serum against any disease unless, as obtains in the case of antidiphtheria serum, the quantity of antitoxin contained in the few cubic centimeters of foreign blood which can be inoculated into the patient is sufficiently considerable to neutralize at least a substantial fraction of the bacterial toxin generated in the system.

M. Richardson,² after directing attention to the frequency (21 per cent. of all cases) with which *typhoid bacilli* are found in the urine of *typhoid patients* and the importance of disinfecting the urine in typhoid fever, states that in *urotropin* we have a drug which will in the vast majority of cases remove the organisms from the urine, not only in the cases of simple bacilluria, but also in those in which a cystitis has resulted. Janet,³ Musser,⁴ and Herrick⁵ also speak favorably of *urotropin* in *typhoid bacilluria*. Janet and W. Coleman⁶ each report an instance in which the drug excited hematuria.

Rosenthal⁷ and E. Heuss⁸ consider *helmitol* (a combination of anhydromethylcitronic acid with urotropin) superior to urotropin as a urinary disinfectant. The dose of *helmitol* is from 15 to 25 grains (1 to 1.6 gram) three or four times a day.

Encouraging reports upon the *operative treatment of intestinal perforation in typhoid fever* continue to appear. R. Harte⁹ reports 3 successful cases, and states that the key-note of success in dealing with this condition is the early recognition of the lesion.

¹ British Medical Journal, April 4, 1903.

² Boston Med. and Surg. Jour., February 5, 1903.

³ Ann. des Mal. des Organ. Genito-Urin., No. 3, 1903.

⁴ Jour. Amer. Med. Assoc., January 9, 1904.

⁵ Wisconsin Med. Jour., December, 1903.

⁶ Medical News, August 29, 1903.

⁷ Therapie des Gegenwart, December, 1902.

⁸ Monatsh. f. prakt. Dermat., Bd. xxxvi, No. 3.

⁹ Annals of Surgery, July, 1903.

SCARLET FEVER

T. Escherich¹ confirms E. von Leyden's favorable opinion upon the value of *antiscarlatinal serum*. He has employed the serum in 112 cases at the St. Anna-Kinderspital, and finds that when it is used early and in full doses it has marked influence upon the general symptoms. Complications, however, are not affected. There were no deaths among those who received the injections on the first and second days. In 27 cases first treated on the third day the mortality was 7.4 per cent.; in 23 treated on the fourth day it was 17.4 per cent.; in 20 treated on the fifth day it was 30 per cent.; and in the remaining cases the mortality ranged from 33 per cent. to 50 per cent.

Pospischill² has used *Moser's serum* in 26 cases of scarlatina. Of 12 cases with doubtful prognosis, 9 recovered; of 13 with fatal prognosis, 5 recovered. The author observed as a direct result of the injections, fall of temperature, diminution in the frequency of the pulse and respiration, a stronger pulse, disappearance of cyanosis, quiet sleep, and clearing up of the nervous symptoms.

Egart³ presents statistics which appear to show that *disinfecting inhalations in scarlet fever and measles* have a distinct value in lessening the severity of the attack in the individual patient, and in preventing attacks in exposed persons. He assumes that the earliest local symptoms indicate the point of localization of the specific virus,—that is, at the upper end of the respiratory tract. He employed sprays of lime-water mixed with equal parts of water, a 3 per cent. boric-acid solution, a 0.05 per cent. solution of iron trichlorid, and a 3 per cent. solution of sodium chlorid, alternately for five minutes, thrice daily.

E. W. Saunders⁴ recommends the use of *pilocarpin in the treatment of scarlet fever*, and attributes to it moderate reduction of temperature, rapid improvement in the state of the oral and faucial mucous membranes, and prevention of glandular infection. He asserts that it should not be given immediately in conjunction with the coal-tar antipyretics. Atropin furnishes a complete antidote in case of an unsuspected idiosyncrasy for the drug.

DIPHTHERIA

If any further proof of the value of the antitoxin treatment of diphtheria were necessary, it would appear to be furnished by the fol-

¹ Wien. klin. Woch., No. 15, 1903.

² Ibid.

³ Zeitsch. f. Hyg. u. Infektionskrankh., xliv, 1903.

⁴ Archives of Pediatrics, February, 1903.

lowing reports. In 1894, according to the report of the Metropolitan Asylums Board, London,¹ 3042 patients were treated in the Board's hospitals without antitoxin, the mortality being 29.6 per cent. In 1901, 6499 patients were treated with antitoxin in the same hospital, the mortality being 12.5 per cent. In 753 laryngeal cases the mortality was 21.1 per cent. At Brook Hospital 723 cases were treated with antitoxin. The mortality percentage of the first-day cases (38) was 0.0; of the second-day cases (170), 4.1; of the third-day cases (192), 11.9; of the fourth-day cases (137), 12.4; and of the fifth and subsequent day cases (186), 16.6. *For five consecutive years there has not been a death at this hospital among the cases that came under treatment on the first day of the disease, and of those coming under treatment on the second day the mortality has not exceeded 5.4 per cent.* The report of the State Board of Health of Massachusetts is no less favorable. According to this report, the mortality of diphtheria from 1891 to 1894 was 28.3 per cent. In 1895, when antitoxin was introduced throughout the State, the fatality at once fell to 18.9 per cent., and during the next six years the percentage declined from 15.1, 14.1, 13.2, 11.6, 10.2, to 10.5. R. Rudolph² states that in 42 cases of diphtheria treated with antitoxin in the Victoria Hospital, Toronto, between January 1 and July 1, 1902, there was but one death, and that this occurred in a young girl who had a history of nephritis prior to her attack of diphtheria.

SMALLPOX

The excellent results obtained in the treatment of certain pustular skin diseases with *carbolic acid* has led Duhr³ to try the remedy in *smallpox*. He reports 4 cases in which the pure acid was applied carefully to the papules with a small camel's-hair brush. It is claimed that the treatment averts suppurative fever, destroys the offensiveness of the pustular stage, and prevents pitting. A. E. Brindley and F. W. Bonis⁴ report 35 cases of *smallpox treated by pencilling the vesicles with pure carbolic acid*. A large number of the cases had never been vaccinated, and 22 were very severe. Five cases proved fatal; 2 of these were complicated with scarlet fever, and a third was malignant smallpox with subcutaneous hemorrhages. According to the authors, the action of the drug is not irritating and appears to be a local one, the drug penetrating the walls of the vesicles and disinfecting their contents. J. T. Neech

¹ British Medical Journal, March 14, 1903.

² British Medical Journal, May 9, 1903.

³ Lancet, February 21, 1903.

⁴ Lancet, October 24, 1903.

and J. F. Hodgson¹ also report favorably on the local use of carbolic acid in smallpox. One hundred and thirty-six cases were treated. Of these, 35 were unvaccinated and 4 died, a mortality of 11.4 per cent.; 101 were vaccinated, of whom 1 died, a mortality of 0.99 per cent. Carboluria was noted in two cases. The applications were continued until the vesicles dried up. Complications were entirely absent, and the patients were discharged a week or two weeks before the usual time.

J. J. Ridge² reports *favorable results in smallpox from inunctions* (every 4 hours) *with guaiacol dissolved in olive oil* (1 part to 80). Of 102 patients treated, 9 died. Five of the fatal cases were unvaccinated children.

Kolbasenke,³ since 1896, has used *ichthyol in the treatment of smallpox*. The results, he claims, have been very good. He employs an ointment composed of 1 part of ichthyol and 1 part of vaselin.

Niels Finsen⁴ claims that unless an epidemic of smallpox is of an exceptionally fatal character, the mortality may be reduced 50 per cent. by the employment of the *red-light treatment* first advocated by him 10 years ago. If, however, he asserts, suppuration has begun or is on the point of beginning, the red-light treatment will not stop it. J. F. Schamberg⁵ states that he does not believe in the efficacy of the red-light treatment, and reports 2 cases of a confluent type in unvaccinated young men in which this treatment was employed after the third day of the eruption. One of these patients died and the other recovered with the most disfiguring scars. Finsen,⁶ in a second paper, calls attention to the unfairness of Schamberg's test, pointing out that the patients were unvaccinated, delirious men, with confluent smallpox, and were not subjected to treatment until the third day of the eruption, or the seventh day of the disease.

ERYSIPELAS

Krukenberg⁷ has employed the *red-light treatment in 18 cases of erysipelas* with good results. The efficacy of the treatment is attributed to the absence of the chemical rays in the red light. E. Martsinowski⁸ has successfully used a solution of *potassium permanganate* (enough of the drug to make a solution of a deep violet color) on lint in numerous

¹ Lancet, December 26, 1903.

² British Medical Journal, May 30, 1903.

³ Die Heilkunde, May, 1903.

⁴ British Medical Journal, June 6, 1903.

⁵ Jour. Amer. Med. Assoc., May 2, 1903.

⁶ Jour. Amer. Med. Assoc., November 14, 1903.

⁷ Lyon Médical, No. 42, 1902.

⁸ Medizinskal Obosrenil, No. 5, 1903.

cases of *erysipelas*. Meyer¹ and Guizzetti² report favorably upon the use of *antistreptococcus serum in erysipelas*.

Henins³ has successfully employed *anesthesin* (ethylic ether of paramidobenzoic acid), in the form of a 10 per cent. ointment made with equal parts of lanolin and vaselin, in 25 cases of *erysipelas*.

PNEUMONIA

L. Panichi⁴ reports the results of his clinical experience with a new *antipneumococcic serum* prepared in Tizzoni's laboratory. The serum was employed in 7 cases of pneumonia of a severe type with pronounced cerebral symptoms. The ages of the patients were from 14 to 42 years. In one case treatment was instituted too late to be of service. The author is convinced that this serum is of great value, because it not only lowers the temperature, but because it also produces a direct effect upon the morbid process, softening and liquefying the exudate in the lung.

J. A. Scott and C. M. Montgomery⁵ have experimented with *creasote carbonate in the treatment of pneumonia*. They find that the mortality percentage (14.9) secured in 67 cases does not corroborate the unusually low figures of Van Zandt, Wilcox, and others, nor does it prove that the results are due to the treatment by creasote carbonate, as equally good results have been secured in past years by other methods. The reviewer's experience with creasote carbonate in pneumonia is closely in accord with that of Scott and Montgomery.

WHOOPIING-COUGH

N. Swoboda⁶ has employed *aristoquinin in 10 cases of whooping-cough* with good results, thus confirming H. Sturtsberg's⁷ favorable experience with the drug. Aristokinin is chemically a neutral carbonic ester of quinin, containing 96 per cent. of quinin. It occurs as a white, tasteless powder, insoluble in water. For children under 1 year, Swoboda advises daily doses of 5 grains, and in older children not over 15 grains a day.

J. Weigl⁸ finds *dionin useful in whooping-cough*. According to the

¹ Zeit. f. diet. und physik. Therap., April, 1903.

² Riforma Medica, xix, No. 45, 1903.

³ Therap. der Gegenwart, No. 1, 1903.

⁴ Gaz. degli Osped., April 19, 1903.

⁵ Therapeutic Gazette, December 15, 1903.

⁶ Wien. klin. Woch., March 5, 1903.

⁷ Münch. med. Woch., November 11, 1902.

⁸ Wien. klin. Rundschau, November 30, 1902.

author, the disease is not materially shortened by the drug, but the severity and number of the paroxysms are distinctly lessened.

Stepp¹ reports in detail 14 cases of *whooping-cough treated with fluoroform* (1 or 2 teaspoonfuls daily). The author claims that the drug has a specific influence. The duration of the disease from the beginning of the treatment varied from 11 to 28 days. Fluoroform is said to be tasteless, odorless, and non-toxic.

Since 1899, G. De Simoni² has been using *formaldehyd locally in whooping-cough* with very favorable results. In one epidemic alone 155 cases were managed successfully, the solution for spraying being made from 1 to 2 per cent. of the commercial 40 per cent. solution. No toxic effects were noted.

Accidents from the use of bromoform in pertussis continue to appear. H. K. Dillard³ reports a case of *bromoform poisoning* in a child of 16 months. Four drops were given, and 2 hours later a second dose (not the last in the bottle) of 4 drops was given. A few minutes after the administration of the second dose, the muscles relaxed, the skin became cold, and unconsciousness followed. When seen a half-hour later, the child presented pin-point pupils, a weak, irregular pulse, shallow respiration, and cyanosis. Under lavage, artificial respiration, and the hypodermic use of stimulants, recovery followed in a few hours. A. L. Oberdorfer⁴ relates a similar experience in a child of 4½ years. In this instance the bad effects were not attributed to the dose (5 drops), but to decomposition of the bromoform, free bromin and hydrochloric acid having been found in the upper layer of fluid in the bottle.

Sobel⁵ has employed the method of *treating the paroxysms of pertussis by pulling the lower jaw downward and forward* in 96 cases. He found that it was usually successful in the cases of children sufficiently old to understand the object of the procedure, but that in infants and nervous children the crying produced by the fear of the manipulation materially interfered. The treatment is executed by standing behind the child with both thumbs on the angles of the jaw and making downward and forward pressure with the index fingers on the zygomatic arches and the remaining fingers on the chin. The mother or nurse can readily be taught the method, which overcomes the laryngeal spasm in the large majority of cases.

¹ Prag. med. Woch., April 2, 1903.

² Il Policlinico, October 10, 1903.

³ Therapeutic Gazette, April 15, 1903.

⁴ Archives of Pediatrics, November, 1903.

⁵ Medical Record, April 18, 1903.

MALARIA

The experience of J. Michon,¹ in Corsica, is opposed to the teaching of Celli that *quinin salts* should not be used as *prophylactic agents against malaria*. He has found the hydrochlorid in doses of 11 grains every third day most effective in preventing the occurrence of infection, even when the conditions were most unfavorable. He prefers the hydrochlorid to the sulphate because it is more soluble and more easily absorbed, less irritating to the stomach, and contains a large proportion of quinin. Aufrecht² recommends as a convenient method of using *quinin hypodermically*, combining it with urethane, whereby it is rendered more soluble. For one injection he prescribes: quinin hydrochlorid, $7\frac{1}{2}$ grains (0.5 gram); urethane, $3\frac{3}{4}$ grains (0.25 gram); and distilled water, 80 minims (5 c.c.).

Audrey,³ De Carlo,⁴ and Aguilar⁵ report cases illustrating the efficacy of *euquinin in the treatment of malaria* in children. Euquinin is the ethyl-carbonic ester of quinin. It has an advantage over quinin in being tasteless; it is, however, twice as costly as quinin and less than half as active.

Moore and Allison⁶ conclude, from a study of the action of *methylene blue in malaria*, that it will destroy the hemocytozoa in many cases, but is less certain than quinin; that it is probably most useful in chronic cases, but has no advantage over quinin; that it is useful when quinin cannot be taken owing to idiosyncrasy; that it would probably be of value in hematuric and hemoglobinuric fevers on account of its diuretic action; and that the effects of methylene blue are ordinarily more unpleasant than those of quinin.

TETANUS

The exact value of *tetanus antitoxin* still remains undetermined. Vallas⁷ has collected 373 cases of tetanus treated with antitoxin with the following results: Total mortality, 39 per cent. Incubation of 10 days, 141 cases, mortality 57 per cent.; incubation of more than 10 days, 118 cases, mortality 20 per cent.; incubation not determined, 114 cases, mortality 36 per cent. F. A. Packard and R. Wilson⁸ have col-

¹ Arch. Gén. de Méd., June 23, 1903.

² Therap. Monats., No. 2, 1903.

³ Lyon Médical, December 28, 1902.

⁴ Gaz. degli Osped., No. 141, 1902.

⁵ Revist. Valenc. de Cienc. Med., No. 36, 1902.

⁶ Medical News, December 6, 1902.

⁷ Jour. Amer. Med. Assoc., January 3, 1903.

⁸ Amer. Jour. Med. Sciences, December, 1902.

lected from literature 1216 cases of tetanus treated with antitoxin. Of these, 702 ended in recovery and 514 ended fatally, a mortality of 42.2 per cent. Of 67 cases not treated with antitoxin, 49 ended fatally, a mortality of 73.1 per cent. The authors conclude that the antitoxin treatment has reduced the general mortality from about 80 per cent. to between 40 and 50 per cent.; of acute tetanus, from 90 per cent. to between 70 and 80 per cent., and of chronic tetanus, from 40 per cent. to about 20 per cent. Von Schuckmann¹ reports a fatal case of tetanus (incubation 10 days) in which antitoxin was used without noticeable effect. He believes that in its present form the remedy is not likely to have any material effect upon the course of the disease.

W. H. Luckett² reports 2 cases of acute tetanus, in which the incubation period was respectively 7 and 5 days, which ended in recovery, the treatment consisting in daily *subarachnoid spinal injections of antitetanic serum* (2 to 4 drams). In contrast with these cases a third is cited, in which the incubation period was 6 days, and which proved fatal under the ordinary symptomatic treatment. Sicard³ cites 7 cases of tetanus (two personally observed) treated with subarachnoid injections with but one death. In his own cases, acting on the assertion of Marie and Morax that tetanus toxin, besides being carried to the brain by way of the blood may reach it also by way of the peripheral nerves, he supplemented the subarachnoid injections by injections not only at the point of injury, but also along the nerve trunks. Both cases promptly ended in recovery.

In 1899 Baccelli reported 40 cases of *tetanus treated with subcutaneous injections of carbolic acid*, and of these but one died. D. Symmers⁴ has collected from literature 42 additional cases; in 16 death occurred, a mortality of 38.1 per cent. According to G. W. Norris,⁵ 7 cases have been treated in the Pennsylvania Hospital by the Baccelli method with a mortality of 8.5 per cent. Much of the testimony favorable to the Baccelli method of treatment has emanated from Italy, that from other countries being distinctly less favorable. It may be, as Pfeiffer suggests, that tetanus in Italy pursues a milder course than in other countries.

PLAGUE

C. E. Forsyth⁶ reports the results of 30,609 injections of *Haffkine's plague prophylactic*. Of those injected, only 329 were attacked by

¹ Deut. med. Woch., March 5, 1903.

² Medical News, April 18, 1903.

³ Jour. Amer. Med. Assoc., November 21, 1903.

⁴ Amer. Med., August 15, 1903.

⁵ Phila. Medical Journal, May 16, 1903.

⁶ Lancet, December 12, 1903.

plague, and of these only 50 died, a reduction of the case mortality to 15 per cent. in a disease in which it is usually about 50 per cent. In 31,874 uninoculated persons there were 1457 cases of plague (attack rate per cent., 4.5) and 659 deaths (case mortality, 45.2). In 12,886 inoculated persons there were 171 cases of plague (attack rate per cent., 1.3) and 29 deaths (case mortality per cent., 16.9). A. Ferrari¹ also reports favorably upon the serum treatment of plague. In his 56 cases the mortality was 15.3 per cent., but 2 of the patients were moribund when first seen. The mortality of the severe cases was 22 per cent., and in 6 cases of the most serious form of secondary plague pneumonia only 33 per cent.

D. L. Cairns² draws the following conclusions from an experience gained during the two recent outbreaks of plague in Glasgow: (1) That Yersin's serum is a remedy of the greatest value; (2) that its action is bactericidal, as shown by the degeneration induced in the bacilli, as well as antitoxic; (3) that this double action of the serum is best secured by its early administration in large doses, both subcutaneously into the lymphatic area which drains toward the bubo, and also intravenously; and (4) that in very mild cases subcutaneous injection alone will probably suffice, but in severe cases the combined method should be employed. For these latter the initial combined dose should be, perhaps, from 150 to 300 c.c., the proportion given intravenously varying with the relative severity of the general symptoms.

TUBERCULOSIS

E. L. Trudeau³ presents an interesting review of the *work done at the Saranac Sanatorium*. He traces the history of the institution from the time he went into the Adirondack wilderness, 30 years ago, in an attempt to prolong his own life, up to the present time. Of 1500 patients who have been discharged from 2 to 17 years, 434 could not be traced, leaving 1066 which have been traced. Of these, 46.7 per cent. are living. Of these, 31 per cent. are known to be well at present, in 6.5 per cent. the disease is still arrested, 4 per cent. have relapsed, 5.2 are chronic invalids, and 53.3 per cent. are dead. As to the influence of the stage of the disease on the permanency of the results obtained, he found that 66 per cent. of 258 patients with incipient tuberculosis are well, and of those far advanced in the disease, 2.5 per cent. only re-

¹ Brazil Medico, xvii, No. 4, 1903.

² Lancet, May 9, 1903.

³ Medical News, October 24, 1903.

mained cured. He believes that, on the whole, tuberculin has a slight, though appreciable, influence for good in pulmonary tuberculosis.

A. Marmorek¹ holds that the *toxin of tuberculosis* has not hitherto been produced outside the organism, because the bacillus has not been grown under conditions faithfully reproducing those under which it grows in the body. He has found that the bacilli grown upon a glycerinated liver bouillon rapidly produce a virulent toxin, and that by immunizing animals with this toxin an antitoxin is produced capable of protecting against an ulterior bacillary infection. After having repeatedly proved that the *antitoxic serum* could prevent tuberculous infection after intravenous injection with the bacilli, its effects were tried upon the human subject. So far the results, according to Marmorek, have been most satisfactory, although the cases treated have almost all been far advanced in the disease. Unfortunately, Marmorek's work has been discredited by his former colleagues in the Pasteur Institute, and therefore his results must be accepted with caution.

S. Bonney² has used *antistreptococcic serum* as a last resort in 25 cases of tuberculosis in which streptococci were abundant in the sputum. One case presented improvement so remarkable as to insure recovery. In another there was a speedy termination of a streptococcic pneumonia; another recovered from severe septic pneumonia; 4 others showed marked improvement, 8 definite improvement, and 8 some improvement. In 3 cases the effects were doubtful, and in 3 there were no results.

B. S. Knotte³ and A. Josias and J. C. Roux⁴ speak very favorably of the treatment of tuberculosis by meat-juice and raw meat,—*zomotherapy*. L. Brown,⁵ however, concludes from a series of experiments on dogs that raw meat has no perceptible effect on the duration of experimental tuberculosis in dogs if the bacilli are virulent and a sufficient number are injected intravenously; that raw meat has no effect upon the prolongation of experimental tuberculosis in dogs, even if the bacilli are attenuated, provided a reasonable quantity be injected intravenously; that under the same conditions dogs fed on a mixed diet with no raw meat may live a much longer time.

D. Chowry-Muthu⁶ thinks that *formaldehyd* is of great value in the treatment of pulmonary tuberculosis. He refers to three methods of

¹ Lancet, December 12, 1903.

² Medical News, June 13, 1903.

³ Rousaky Vrach, November 1, 1903.

⁴ Bull. Gén. de Thérap., vol. cxlvi, No. 8, 1903.

⁵ Amer. Jour. Med. Sciences, June, 1903.

⁶ British Medical Journal, October 24, 1903.

administration: Inhalation, intravenous injection, and cataphoresis. Of these he prefers inhalation. For the inhalations to be efficacious, he points out, the inhaler must cover the nose and must be worn continuously for as many hours as possible. The inhalant recommended is as follows: Formalin (40 per cent.), 1 part; chloroform, 1 part; rectified spirits, 2 parts. A few drops of ammonia are added to neutralize the pungency of the vapor. W. G. Shallcross¹ also speaks favorably of *formalin inhalations*. He recommends equal parts of formalin and 95 per cent. alcohol, adding chloroform, creasote, or guaiacol, when it is deemed necessary.

A. Landerer² reiterates his belief in the efficacy of *sodium cinnamate in tuberculosis*, and claims that under its administration a cure may be looked for in 90 per cent. of mild cases, and in at least 70 per cent. of all cases. W. Robinson³ concludes, from a very careful study of the literature and from his own impressions, that sodium cinnamate is probably a useful adjuvant to other remedies in tuberculosis. Personally, however, he prefers creasote and its derivations. S. Cohen⁴ reports 14 cases of tuberculosis, the majority being mild, in which he employed intravenous injections of sodium cinnamate, $\frac{1}{12}$ to $\frac{1}{8}$ grain (0.005 to 0.008 gram) thrice weekly. He finds that none were cured, 1 was somewhat improved, 7 remained stationary, 5 were worse, and 1 died.

C. Fuchs,⁵ M. Chartier,⁶ and L. Friedmann⁷ speak favorably of the action of *thiocol in tuberculosis*. Thiocol is chemically guaiacol sulphonate of potassium, and appears to possess no advantage over other guaiacol preparations except that it is soluble.

H. Herbert⁸ has used *methylene blue* $\frac{1}{2}$ to 3 grains, 0.03 to 0.2 gram, thrice daily) in 20 cases of phthisis. He finds that it lessens cough and reduces the amount of expectoration, but that it frequently causes vomiting, strangury, and a choking sensation—probably on account of impeding expectoration.

H. Tickell⁹ reports 5 cases of *hemoptysis* in which he used with success *rectal injections of gelatin*. In contradistinction to the hypodermic injection, the rectal is said to be painless, to be free from the

¹ Phila. Med. Journal, December 13, 1902.

² Journal of Tuberculosis, January 1, 1903.

³ Merck's Archives, December, 1902.

⁴ Berlin. klin. Woch., March 30, 1903.

⁵ Wien. klin. Rundschau, No. 22, 1902.

⁶ Merck's Archives, May, 1903.

⁷ Prag. med. Woch., April 9, 1903.

⁸ Journal of Tuberculosis, No. 1, 1903.

⁹ Lancet, February 28, 1903.

danger of infection, and not to cause rise in temperature. The solution is prepared as follows: 50 grams of gelatin are dissolved in 1300 c.c. of boiling water and boiled very gently for 1 hour, when the volume will have been reduced to about 1000 c.c. (1 quart). The solution is then cooled to the body temperature, and 250 c.c. slowly passed into the rectum from an ordinary irrigator. The injection is given three times a day until the sputum shows no traces of blood. Dieulafoy¹ reports a case in which a fatal attack of *tetanus* followed a *subcutaneous injection of gelatin* in a phthisical woman, aged 38 years. The author points out that this is not an exceptional instance, as no less than 23 such cases have been recorded in the course of the past two years.

RHEUMATISM

Aspirin, a compound produced by the action of acetic anhydrid on salicylic acid, has lately been largely employed as a substitute for sodium salicylate in the treatment of rheumatism. It is said to resist decomposition in the stomach, and to be broken up in the intestines into nascent salicylic acid and acetic acid, the latter subsequently uniting with alkalies to form sodium and potassium acetates. It is undoubtedly better borne by the stomach than most salicylic compounds, but it appears to be just as potent as the latter in causing tinnitus and renal irritation. Otto² reports a case in which the administration of 15 grains (1 gram) of aspirin was shortly followed by violent itching and tense swelling of the skin, and a second dose by edema, itching, thirst, dizziness, and vomiting. A similar case has been reported by Meyer. J. Moore³ asserts that as an antirheumatic the salicylate of quinin has few equals, and is surpassed only by sodium salicylate. In rheumatism associated with depression it may be substituted for sodium salicylate, and may be given in doses of 5 grains thrice daily in cachets.

Attention has recently been called to another salicylic compound intended for external use in rheumatism; this is *mesotan*, the methoxy-methyl ester of salicylic acid. It occurs as a yellow liquid, having a faint odor of wintergreen, and miscible with oils and other organic solvents. It is readily absorbed by the skin, and within from 40 to 50 minutes after its local application salicylic acid can be detected in the urine. It may be applied to the affected joints undiluted or mixed with from 1 to 2 parts of an indifferent oil. Undiluted, it sometimes causes, as in 2 cases reported by H. Roeder,⁴ severe dermatitis. T. Floret,⁵

¹ Bull. de l'acad. de Méd., No. 19, 1903.

² Deut. med. Woch., February 12, 1903.

³ Practitioner, January, 1903.

⁴ Münch. med. Woch., December 16, 1902.

⁵ Deut. med. Woch., October 16, 1902.

E. Reichmann,¹ K. Liepelt,² and A. Herschmann³ report cases illustrating the efficacy of mesotan. The reviewer has used the remedy in five or six cases, but has failed to observe any more pronounced effect from its application than is obtainable from methyl salicylate.

CONSTITUTIONAL DISEASES

CHRONIC RHEUMATISM.—Winkler⁴ believes that the use of extreme heat, either in the form of hot baths or hot mud baths, although it may not produce any immediate symptoms, if persisted in leads to weakening of the heart-muscle, so that patients who have undergone a course of treatment may return home and develop in five or six months afterward dangerous cardiac symptoms. On the other hand, he claims that excellent results follow the use of prolonged baths of moderately warm temperature. He recommends mud baths in the treatment of chronic rheumatism, from 20 to 50 minutes, at a temperature of from 99° to 114° F.; sand baths, 115° to 120° F.; steam baths, 95° to 114° F., and from 20 to 30 minutes' duration. The dry-air baths he employs by exposing the patient at first to a temperature of about 120° F. for half an hour, and later to a temperature of 150° F. for about 5 minutes. After each bath he deems it advisable to employ a cold douche. The bath should not be given oftener than every other day. He employs as an adjuvant the local hot-air bath on alternate days with the general hot bath. He is convinced that the excessively high temperatures, such as 300° F., which have been employed, are irrational and of little use.

GOUT.—A. P. Luff⁵ considers gout a disease of faulty metabolism, as a result of which certain poisons (possibly the purins and other bodies) are produced. He thinks that with increasing knowledge of the disease, uric acid will, in all probability, have to be relegated to a position of subsidiary importance in the pathogenesis of the disease. As regards treatment, he believes that the patient rather than the disease is the prime feature. As a local application for acute gout he has found the following lotion most useful:

Sodium carbonate,	4 ounces,	120 c.c.
Belladonna liniment,	2 drams,	75 c.c.
Tincture of opium,	1½ ounces,	45 c.c.
Water, to make	8 ounces,	250 c.c.

¹ Therap. der Gegenwart, No. 12, 1902.

² Berlin. klin. Woch., April 20, 1903.

³ Wisconsin Medical Journal, March, 1903.

⁴ Bal. Centralzeitung, 143, 1903.

⁵ Practitioner, July, 1903.

This should be diluted with an equal quantity of water and applied on cotton-wool.

Blistering and leeching are condemned. For internal treatment of acute gout he prefers colchicum in combination with potassium salts, and a mild mercurial.

As means of checking the excessive formation of purin bodies, he recommends careful attention to diet and regimen, the use of mild cathartics such as compound licorice powder, or an occasional blue pill with euonymin followed by Epsom salts, the administration of guaiac resin (5 to 10 grains, 0.3 to 0.6 gram, in cachets, two or three times a day) of potassium salts, preferably the citrate, and of colchicin. The latter he prescribes in the form of a pill, given thrice daily, containing $\frac{1}{100}$ grain (0.001 gram) of colchicin with $\frac{1}{4}$ grain (0.015 gram) of extract of nux vomica and 1 grain (0.06 gram) of extract of gentian. He cautions against the use of colchicin, however, when there is marked interstitial nephritis. Luff knows of no more useful drug than guaiac resin in the preventive treatment of gout. The salts of lithium are considered to be inferior to the potassium and sodium salts. He has found the various combinations of quinic acid of decided use in certain form of chronic gout. As to diet, he is of the opinion that the meals should be simple, that is, not made up of too many articles. Meat, even red meat, should not be excluded, as no class of food-stuff is so productive of energy as animal food. The exclusion of any article of diet, he holds, without taking into account the surroundings of the patient and his peculiarities is unscientific. As to climate, he believes that a fairly bracing air with a low relative humidity is the most suitable. High mountains and valleys with excessive relative humidity are alike unsuited to the gouty. Exposure to cold east and northeast winds are especially to be avoided. As a winter resort he knows of no better climate than that of Egypt. Residence by the sea is not suited to most cases.

W. Bain¹ concludes, from a study of *the influence of some modern drugs on metabolism in gout*, that piperidin tartrate, piperazin, lysidin, and sidonal, in the order named, showed an increasingly augmenting effect on uric acid secretion, and that lithium benzoate and urotropin were ineffective.

DIABETES.—C. von Noorden² publishes tables showing the *effect of a diet composed largely of oats* upon the urinary elements in 5 cases of *diabetes*. The diet is prepared by cooking oat flakes for a long time

¹ British Medical Journal, January 31, 1903.

² Berlin. klin. Woch., September 7, 1903.

in water, to which is added salt, butter, and a vegetable proteid—or, after cooling, the beaten whites of eggs. Two hundred and fifty grams of oats, 100 grams of egg albumin, and 300 grams of butter are given daily, in some instances, with wine and a small amount of black coffee. von Noorden concludes that while this method is excellent in a certain number of cases, it is not advisable in all cases, and in some may be harmful.

R. T. Williamson¹ has used *aspirin* in 11 cases of *diabetes*. In the severe forms the drug was without influence on the glycosuria, in mild cases the sugar elimination was clearly diminished. He does not think that aspirin has any advantage over sodium salicylate, except that it produces less gastric disturbance and is less liable to excite toxic symptoms. Large doses, however, sometimes produced the same toxic effects as other salicylic compounds. He recommends 10 grains (0.6 gram) two or three times a day, cautiously increased to 15 grains (1 gram), four, five, or six times a day, if no untoward effects appear.

H. Richardson² has found *sodium glycocholate* of value, in doses of 5 grains (0.3 gram) thrice daily, in diabetes and other conditions in which it may be necessary to use large quantities of fat. Boigey³ draws attention to the various diseases in which yeast has been found efficacious, and maintains that *beer-yeast* is one of the most effective remedies we possess in *diabetes*. He ascribes its efficacy to its power of converting starchy matter into alcohol.

DISEASES OF THE BLOOD

SPLENIC ANEMIA.—In 1901 Harris and Herzog reported 19 cases of *splenectomy in splenic anemia* with 14 recoveries. J. A. Scott⁴ has collected since their report 6 additional cases with 4 recoveries. Quénu and Duval⁵ report still another case of splenomegaly with hepatic cirrhosis, in which splenectomy was followed by great benefit.

HODGKIN'S DISEASE.—N. Senn⁶ reports 2 cases of *Hodgkin's disease*, W. B. Coley⁷ another case, and S. Childs⁸ a third case, all of which were distinctly *improved by the x-rays*.

¹ British Medical Journal, No. 2191, 1902.

² Medical Record, January 31, 1903.

³ Arch. Gén. de Méd., April 7, 1903.

⁴ Amer. Jour. Med. Sciences, November, 1903.

⁵ Rev. de Chirurgie, No. 4, 1903.

⁶ New York Medical Journal, April 18, 1903.

⁷ Medical Record, March 21, 1903.

⁸ Medical News, January 21, 1903.

HEMOPHILIA.—E. Fuller¹ reports 2 cases of obstinate bleeding in *hemophiliacs* arrested by the administration of *thyroid extract*, thus confirming the favorable opinion of the efficacy of the drug in hemophilia originally expressed by Combemale and Gaudier and Delace.

DISEASES OF THE DUCTLESS GLANDS

ADDISON'S DISEASE.—Boinet² reports 8 cases of *Addison's disease* treated with *subcutaneous injections of suprarenal extract*. He prefers an aqueous-glycerin extract, made according to the Brown-Séquard method, the dose not exceeding 1 c.c. Six of his patients were much improved after an average of 220 injections, but two, in the more advanced stages of the disease, died in from two to four days after the treatment had been instituted. He warns that this treatment is contraindicated in severe and advanced cases of the disease.

E. W. Adams³ tabulates the results in 105 cases of *Addison's disease* treated by *organotherapy*. He arranges the cases in 4 groups: (1) Cases in which alarming or fatal results were presumably due to the treatment—7; (2) cases uninfluenced by the treatment—49; (3) cases in which marked improvement was coincident with treatment—33; (4) cases in which permanent benefit (? cures) accrued apparently as a result of the suprarenal feeding—16. From a study of these cases Adams draws the following conclusions: (1) There appears to be a certain class of cases of Addison's disease which derives indubitable benefit from the exhibition in some form of suprarenal substance, though in any given case it remains impossible to determine the probable response to the treatment. (2) In any given case of the disease, selected haphazard, the probability obtains that disappointment will follow the institution of organotherapy, but that probability is very distinctly less than attaching to any alternative method of treatment at present known. (3) The last word upon the preparation to be used and its method of administration remains to be said. The problem seems to be to get a sufficient and continuous dose of the pure and active principle unchanged in the blood stream. Intravenous injection is impracticable.

EXOPHTHALMIC GOITER.—Kirnberger,⁴ upon the assumption that the symptoms of exophthalmic goiter are the result of iodic intoxication caused by excessive production of iodothyryn, has employed *sodium*

¹ Medical News, February 28, 1903.

² Bull. de l'Acad. de Med., lxxvii, No. 39, 1903.

³ Practitioner, October, 1903.

⁴ Therap. des Gegenwart, No. 10, 1903.

sulphanilate in the treatment of the disease, this remedy having been previously recommended by Ehrlich and Kronig as an antidote to iodine. Under the administration of 150 grains (10 grams) daily, it is claimed that there was a gain in weight and a marked slowing of the pulse, but no reduction in the size of the goiter or lessening of the tremor.

O. Lanz¹ has observed very marked improvement in 6 patients with exophthalmic goiter to whom were given the *milk of goats that had been deprived of their thyroid glands*. According to the author the improvement continued even after the milk was withdrawn, and in one case the patient recovered from what appeared to be the terminal stage of the disease.

DISEASES OF THE CIRCULATORY SYSTEM

ACUTE HEART FAILURE AND SHOCK.—E. Martin,² in discussing *the treatment of cardiac and respiratory failure during general anesthesia*, states that these conditions are best counteracted by hypodermic injections of cocaine, caffeine, and normal salt solution, employing in the latter 2 drams (7.5 c.c.) of adrenalin (1 to 1000) to the pint (500 c.c.), and using a sufficient quantity to restore the vascular tone. Absorption of the adrenalin should be hastened by vigorous massage, and when the emergency is great the drug should be given intravenously, preferably diluted 50 times with normal salt solution.

Crile³ concludes that shock is chiefly due to paralysis of the vasomotor center, and that collapse is excited by the same factor, although in the latter the exhaustion of the center is not so complete. Assuming this to be true, he believes that ordinary stimulants may be of service in collapse, but that they can do no good in shock because the center upon which they act is completely paralyzed; and further, that adrenalin is of value in shock because it acts upon the heart and blood-vessels independently of the center, and thus may restore and maintain to some degree a normal arterial pressure, even when the vasomotor center is too depressed to irradiate impulses.

ACUTE ENDOCARDITIS.—D. B. Lees⁴ advocates the free use of *salicylates in acute endocarditis* the result of rheumatism, contending that the only contraindication to their use is marked deepening of the inspiration apart from pericarditis, resembling the "air hunger" of diabetic coma. He states that the addition of sodium bicarbonate in a

¹ Münch. med. Woch., No. 4, 1903.

² Therapeutic Gazette, May 15, 1903.

³ Boston Medical and Surgical Journal, March 5, 1903.

⁴ British Medical Journal, November 21, 1903.

quantity equal to twice that of the salicylates is usually sufficient to prevent the occurrence of this symptom. He discountenances the tradition that salicylates depress the heart and thinks that cardiac depression is probably due to impurities in the drug and still more to the rheumatic toxins themselves. Other methods of treatment mentioned as of value are the application of cold, which is a powerful means of repressing cardiac inflammation, and, under certain conditions, keeping the patient warm, if necessary by hot-water bottles, when an ice-bag is applied to the precordium, keeping the warmth up during the whole period of its application, and using leeches, if necessary, to prevent over-distention of the right auricle. He asserts that the ice-bag may be used in this way continuously for days, provided the condition of the auricle is carefully watched.

MALIGNANT ENDOCARDITIS.—Ogle¹ analyzes 19 cases of *malignant endocarditis in which antistreptococcic serum was used*. His conclusions are that the gravest symptoms, combined with streptococcic infection, even of the blood-stream, are not incompatible with recovery if treated by injections of antistreptococcic serum; that this is true also of malignant endocarditis, but that here the chances are probably less favorable because of the colony of streptococci involved in the vegetations being in constant contact with the blood-stream; that in malignant endocarditis staphylococci are frequent, or a mixed infection of staphylococci and streptococci; and if examination of the blood be negative, it would be prudent to use injections of antistaphylococcic serum together with antistreptococcic serum.

CHRONIC AFFECTIONS OF THE HEART.—Bezley Thorne² states that the most promising cases of heart disease for the *Nauheim treatment* are those in which there is a dilated, enfeebled, and irritable heart, as a sequel of influenza. Another class of patients he has found greatly benefited are those with a dilated and enfeebled heart produced by the raised arterial tension, the result of the rheumatic or gouty diathesis. This slowly but continuously acting pressure produces in time an overloaded and overworked heart, and thereby an increasingly impure blood-supply and a progressive weakening of the cardiac systole. Such patients cannot be cured permanently and absolutely, the author contends, because of the very fact that the poison being manufactured in the system and eliminated only by a careful diet and well-regulated life often leads to a recurrence of the heart symptoms in time and makes it almost a necessity that the patient should undergo a course of treatment regularly every twelve months for two or three years, and then

¹ *Lancet*, No. 11, 1903.

² *Lancet*, No. 4168, 1903.

perhaps every second or third year. Cardiac enfeeblement from excessive smoking and prolonged illness such as typhoid fever and malaria is also greatly benefited by the Nauheim treatment, the latter being a most valuable aid to such remedial measures as rest, tonics, and change of air. Among the cases that cannot be cured by the Nauheim treatment, but much benefited, the author classes those of both rheumatic and gouty origin in which the valves have been permanently injured and signs of commencing cardiac failure, such as headache, dyspnea, palpitation, cyanosis, and pain are present. It is self-evident that patients of this class cannot be cured and that one course of baths will not produce a much more lasting or satisfactory effect than any other treatment. According to Thorne the Nauheim treatment is unsuitable in patients who have been habitually heavy drinkers, in those whom one believes to be suffering from syphilitic affection of the heart, in those suffering from marked degeneration of the vessel walls or from typical symptoms of aortic regurgitation, in very old persons and in those usually met with in hospitals who have been broken down by a long struggle to work when unfit and who have been accustomed to bad and even insufficient food.

N. S. Davis¹ states that all forms of heart disease, accompanied by muscular weakness, with or without dilatation, can be treated with hopefulness by *exercise*. The best results, however, are obtained in cases of dilatation which are due to high arterial pressure or physical exertion, and in which there is no, or trifling, degeneration. If there be much degeneration only temporary improvement can be obtained. He believes that for the treatment of obesity and fatty infiltration of the heart, Oertel's treatment is particularly well adapted, although other kinds of graduated gymnastics, with a suitable regulation of diet, also give good results. Resistance gymnastics and massage are well adapted to patients convalescing from acute endocarditis the result of rheumatism or other infection. Such patients, he states, should be kept in bed for at least two weeks after the acute infection which causes the endocarditis is over. During the last half of this time, resistance exercise or the gentlest massage greatly helps to effect speedy compensation. This treatment should, if possible, be continued for some weeks longer, and the amount of walking, stair climbing, etc., should be carefully regulated. Of the chronic valvular diseases, he asserts, the mitral oftenest responds to gymnastics, but numerous cases are met with in which compensation cannot be restored by any treatment. Aortic valvular affections are less certain to be improved, as

¹ Jour. Amer. Med. Assoc., November 14, 1903.

breaks in compensation occur in them frequently after very considerable hypertrophy has taken place, and when a little more cannot afford relief. In degeneration of the heart perfect recovery is rarely affected, but temporary improvement often is. Even angina pectoris is not regarded a contraindication, the author having seen several cases in which great improvement resulted from resistance gymnastics. A cardinal rule of the treatment is that *the exercise must be graduated*. At first only the lightest should be used, and this should be adapted to each case, and very gradually increased in vigor. *Under no circumstances must breathing or the heart be hurried.*

Schedel¹ has employed *barium chlorid* in doses of from $\frac{1}{3}$ to $\frac{3}{4}$ grain (0.02 to 0.05 gram) in 19 cases of cardiac disease. He finds that the drug regulates the rhythm of the pulse, increases its volume, and raises the blood-pressure, and that the indications for its use are the same as those for digitalis.

R. Paine² believes that *apocynum cannabinum* has not taken the rank it deserves as a diuretic, and attributes this in part to the inferior preparations which are frequently dispensed. He recommends the administration of the fluid extract in capsules as the best way of avoiding the nausea that so frequently attends the use of the drug. He cites a case of mitral disease with nephritis in which other diuretics had proved useless, but in which under the influence of apocynum (8 drops of the fluid extract every 4 hours), the urine was increased from 6 ounces to 130 ounces daily.

Two compounds have recently been recommended for their diuretic action, that give promise of being valuable additions to our resources in the treatment of cardiac dropsy. These compounds are known as *agurin* and *theocin*. Agurin is a double salt of sodium acetate and theobromin containing 60 per cent. of theobromin, as compared with 50 per cent. in diuretin. The usual dose is 15 grains (1 gram) thrice daily. Theocin is an alkaloid prepared synthetically from acetic acid. Like theobromin, it is dimethyl xanthin, and differs only from theobromin in the position of the methyl groups. It is said to have little action on the heart or blood-vessels, but to act as a diuretic by stimulating the renal epithelium. The dose is from 3 to 8 grains (0.2 to 0.5 gram), well diluted, after meals. A. Nusch³ reports the clinical data of 4 patients, in all of whom the amount of urine was considerably increased by the administration of agurin. He finds the best effects are

¹ Deut. med. Woch., February 12, 1903.

² St. Louis Courier of Medicine, January, 1903.

³ Münch. med. Woch., December 23, 1902.

seen in uncomplicated heart disease. Very good results were also obtained in pleurisy with effusion, while in parenchymatous nephritis the drug was without effect. L. Ketly¹ and M. Salacoin² also report favorably upon agurin. O. Minkowski⁴ has used theocin in 14 cases, mostly cardiac and renal affections with edema. He finds it superior to theobromin in being more prompt and powerful in its diuretic action. It appeared to be effectual for a short time only, however, and in several cases it caused nausea and vomiting. K. Hess⁴ reports the case of a man of 67 years with symptoms of disturbed cardiac compensation, among which was very marked edema. A number of diuretics were tried without success. Under theocin, however, the urine increased from 150 c.c. to 3000 c.c., the edema disappeared, and the patient became comparatively well. Chevalier⁵ also speaks favorably of theocin as a diuretic. S. S. Cohen⁶ believes that theocin must be given with caution, as the preliminary diuresis may be followed by suppression. In the reviewer's experience theocin has proved in a number of cases a very active diuretic, its action, however, has been somewhat inconstant, and has rarely been of long duration. H. Huchard⁷ considers *theobromin* one of the best diuretics that we have. He states that it does not affect the heart; it only slightly influences arterial tension; but it acts chiefly as a stimulant to the renal epithelium. He prefers it to diuretin and agurin, and prescribes it in capsules in the dose of 7 grains daily.

DISEASES OF THE KIDNEYS

ACUTE NEPHRITIS.—L. Stembo⁸ has treated twenty patients with *acute nephritis by applications of ice-bags* to both kidneys, held in place with a bandage. After two or three hours he removes the ice for an hour and then replaces it, keeping up this treatment until the albuminuria has entirely disappeared. The ice treatment, according to Stembo, is especially useful in sudden, acute cases of nephritis, and in acute exacerbations of chronic nephritis.

UREMIA.—M. Jaerisch⁹ reports the case of a young girl, aged 17,

¹ Die Heilkunde, No. 8, 1902.

² Thèse de Paris, No. 566, 1902.

³ Therap. der Gegenwart, November, 1902.

⁴ Therap. Monatshefte, xvii, 1903.

⁵ Rev. de Therap., vol. lxx, 1903.

⁶ American Medicine, November 14, 1903.

⁷ Jour. des Praticiens, No. 9, 1903.

⁸ Therapie der Gegenwart, No. 11, 1903.

⁹ Münch. med. Woch., 1903, vol. xxix, No. 13.

who had had acute nephritis of unknown origin. Notwithstanding careful treatment, the patient was attacked with severe uremic convulsions, no less than 47 occurring within 10 hours. She was promptly bled to the extent of 500 grams, and this was followed by an injection of saline solution. The patient did not recover, however, until a second bleeding of 500 grams had taken place, following which the pulse became better and the convulsions diminished, recovery following in a few days.

H. Stern,¹ in discussing the *treatment of uremia by hypodermoclysis* and infusion, mentions the common belief that a hypisotonic sodium-chlorid solution is better than one that is blood isotonic. He has even found the results from a 0.5 per cent. solution to be extremely valuable, and a 0.6 per cent. is better than more concentrated solutions. This, he believes, is on account of the fact that the high osmotic tension of uremic serum is not so largely due to its ionized molecules as to its neutral molecules; and to effect a more general ionization and conductivity, water only is essential.

W. H. Thomson² states that he has at times found *aconite in full doses to produce excellent results in uremia* when other vasodilators have failed. Venesection is the best vasodilator; when this is objected to, the author recommends *veratrum viride*. The most certain diuretic, he believes, is the rectal douche of normal salt solution at 115° C., and the best instrument for this purpose is Kemp's rectal irrigator. He also recommends the injection of small amounts of salt solution into the flank in acute nephritis. He states that thorough oiling the skin before the diaphoretic measures are employed makes these measures more effective by aiding in opening the ducts of the sweat-glands. H. A. Hare³ publishes the answers received in reply to letters sent to well-known physicians asking for opinions as to the *value of morphin in uremic convulsions*. Replies are published from J. Tyson, W. Hale White, W. Ewart, F. Billings, J. H. Musser, and J. M. Anders. The general opinion seems to be that morphin is generally harmful, especially in chronic interstitial nephritis; that it is only in acute cases of parenchymatous nephritis that it may be of value, and then in small doses. Still there is some difference of opinion. Billings considers it a cardiovascular tonic and of great value in cases in which there is cardiac dilatation with vasomotor stasis and a tendency to pulmonary edema. He would give strychnin with the morphin. Musser

¹ American Medicine, May 2, 1903.

² Medical Record, May 16, 1903.

³ Therapeutic Gazette, January 16, 1903.

has found it of great service in uremic asthma, and in one or two cases of chronic nephritis he believes that it was of service in preventing a recurrence of convulsions.

CHRONIC NEPHRITIS.—V. C. Vaughan¹ has found that the *best diet in chronic nephritis* is one, excepting cream and butter, consisting wholly of vegetables. Meat in every form and eggs and milk are forbidden. The cream should not contain more than 1 per cent. of proteid, and should be limited to 1 pint daily. Among the cereals, cornmeal mush is preferred, but oatmeal or cracked wheat may be substituted. Plenty of sugar is allowed for the mush and Zwieback, and butter and potatoes complete the substantials of the ration. Peas and beans, either fresh or canned, green vegetables, and fruits are also allowed. In conclusion, the author says that a scientific demonstration of the value of any diet in chronic nephritis must consist in determining the relative toxicity of the blood-serum of the patient, under different diets, upon animals. This has not been done and offers a promising field of research. C. v. Rzetkowski² cites a case illustrating the fact that *nitrogen-retention is not incompatible with great improvement in the general symptoms of chronic nephritis*, and holds that nitrogen-retention, when associated with improvement in general health, means that the patient is actually building up tissue and not that his excretory powers are growing more imperfect. He concludes that we must attempt to cause nitrogen-retention, so long as there are no unfavorable symptoms, but that it is difficult to maintain metabolic equilibrium with a milk diet, because milk in sufficient quantity is so bulky as to cause great strain upon the heart and vessels; and, besides, the patient readily grows extremely tired of milk. The author insists that the diet should contain not only a fairly large amount of readily digested carbohydrates and fat, but also a moderate quantity of nitrogenous food. Substances that are distinctly irritant to the kidneys, like the following, should be avoided: mineral salts, including table-salt, in more than small amounts, salt meats, meat-extracts, spices, and spicy foods. Meat may best be given boiled, because this removes much of the extractions. Fluids should be used only in moderate quantities because of the danger of burdening the circulation.

Koester³ draws the following conclusions from studies upon a number of patients with nephritis under different *diet régimes*: It is best to begin the treatment of chronic nephritis with a strict milk or milk

¹ Northwest Medicine, September, 1903.

² Zeitsch. f. klin. Med., Bd. xlvI, Hefte 1-4.

³ Nord. Medizin. Archiv. Jarg., 1903, Abt. II, Anhang, 138.

and vegetable diet. When, however, the excretion of albumin during this treatment becomes for some time constant in quantity, then the patient may, without danger, be allowed a more mixed diet, even with meat of any kind. Edema and ascites are no contraindications to a mixed diet if the patient desires it. It is a matter of indifference whether the patient be given red or white meat. Alcohol and condiments are contraindicated. In the discussion of Koester's paper, Aaser, Laache, and Siven agreed with Koester that a strict milk diet in chronic nephritis was not only unnecessary, but might even be harmful. Minkowski, Hess, von Kelty, Holle, and others have reported favorably upon the use of *agurin* and *theocin* as diuretics in chronic nephritis, but the testimony, on the whole, indicates that their action is not so reliable in this disease as in chronic affections of the heart (see also Diseases of the Circulatory System).

DISEASES OF THE RESPIRATORY TRACT

HAY FEVER.—W. P. Dunbar¹ states that he has succeeded, by injecting the pollen of rye and other grasses into various animals, in producing an *antitoxin* which, when applied to the eyes and nostrils of hay-fever patients, in whom the local symptoms of hay-fever have been artificially produced by the previous injection of a toxin isolated from the pollen of certain grasses, immediately quells the subjective symptoms. Felix Semon,² from a limited clinical experience with *Dunbar's antitoxin*, concludes that it gives relief in some cases, and appears to act beneficially in postponing the attacks in other cases. In two of his patients, Semon adds, it had the effect of making the hay-fever period a good deal more tolerable than on previous occasions. Emil Mayer³ has found Dunbar's antitoxin distinctly curative in the forms of hay-fever that occur in the early summer months, but finds that it fails in the autumnal forms. L. S. Somers⁴ also reports favorably upon the use of *golden rod antitoxin* in 10 cases of hay-fever. L. B. Lockard⁵ claims that *nitrohydrochloric acid* (3 to 5 drops of undiluted acid after meals and on retiring) is almost a specific for hay-fever.

BRONCHOPNEUMONIA.—C. G. Kerley⁶ believes that *counterirritation* is an effective measure in bronchopneumonia in children when

¹ Deut. med. Woch., No. 9, 1903.

² British Med. Jour., July 18, 1903.

³ New York Medical Journal, August 8, 1903.

⁴ Proceed. of the Phila. Co. Med. Soc., December 31, 1903.

⁵ Boston Medical and Surgical Journal, January 15, 1903.

⁶ Jour. Amer. Med. Assoc., June 20, 1903.

there is considerable bronchial catarrh. He prefers the mustard plaster, 1 part of mustard to 2 parts of flour, repeated every 6 or 8 hours in severe cases. It should not be removed until there is a distinct irritation of the skin. J. O'Malley¹ has employed *diphtheria antitoxin* in *bronchopneumonia* with excellent results, and reports three cases. He thinks we have in it a most valuable therapeutic agent for a class of cases otherwise beyond therapeutic aid, especially those cases of bronchopneumonia which so often occur as a complication in infectious diseases, such as measles, influenza, pertussis, and scarlet fever.

DISEASES OF THE STOMACH AND INTESTINES

MERCURIAL STOMATITIS.—A. H. Fridenberg² reports a case of *mercurial stomatitis* which proved rebellious to the usual remedies, but which promptly yielded to the use of a mouth-wash of hydrogen dioxid (1 to 3) every half hour.

STRICTURE OF THE ESOPHAGUS.—T. Teky³ reports 5 cases of *esophageal stenosis* in which injections of *thiosinamin* (a compound produced by acting on the volatile oil of mustard with ammonia) were used. In 4 very good results were obtained; in the third the condition grew worse. The author concludes that the remedy is of value only in old stenosis; in recent cases it loosens and thickens the scar tissue, and thus aggravates the difficulty.

ANOREXIA.—P. T. Borrisow,⁴ as the result of an investigation upon *the action of bitters on the appetite and digestion*, concludes the time-honored faith in these remedies sufficiently well founded to warrant their further use; that they render the sense of taste more acute, and excite an increased secretion of gastric juice, the latter resembling in all particulars the normal secretion of the stomach; and that as the appetizing action of bitters is due to their taste, it is obviously useless to administer them in pill form or in capsules or to exhibit them in large quantities; that the best results are obtained by giving them in small amounts immediately before meals.

DEFICIENT GASTRIC SECRETION.—L. C. Mayer⁵ reports the results obtained from *the use of natural gastric juice of pigs in various diseases of the stomach*. According to the author, it not only substituted the inefficient gastric juice, but seemed to have also the power of healing

¹ American Medicine, January 17, 1903.

² American Medicine, January 24, 1903.

³ Klin. Therap. Woch., No. 45, 1902.

⁴ Russki Vrach, August 9, 1903.

⁵ Therap. der Gegenwart, No. 12, 1903.

the inflamed gastric mucosa, and promoting the insufficient secretion. It was found especially useful in tuberculosis, restoring the appetite and slightly increasing the weight. In several cases of anemia accompanied by loss of appetite and vomiting, the administration of the natural gastric juice just before meals cured these symptoms. The dose was from 10 to 15 c.c. Peppermint or lemon-juice is said to completely disguise the taste of the remedy, which in itself is not very unpalatable.

HYPERSECRETION OF GASTRIC JUICE (GASTRO-SUCCORRHEA).—H. Strauss¹ advocates in the treatment of this condition systematic evacuation of the stomach contents with the stomach-tube. In cases of motor derangement he supplements this by lavage, raising the pelvis. An albumin and fat diet is kept up for several weeks—butter and oils, with small frequent meals, rectal feeding, and if necessary, a course of treatment as for gastric ulcer. For medication he prefers alkalies, with silver nitrate if needed, bismuth and atropin if there are paroxysms. Gastro-enterostomy is the last resort.

Picardt² has found *hyoscin of value in gastric hypersecretion*. In his experience it is preferable to atropin, being less likely to cause unpleasant secondary symptoms.

GASTRIC ULCER.—T. D. Griffiths³ treats all cases of gastric ulcer by putting the stomach absolutely at *rest and employing abundant rectal feeding*. The patient is put to bed for at least 12 days, the bowels are cleaned out by enemas, and rectal feeding is commenced almost immediately. Nutrient enemas at a temperature of 97° to 100° F. are given every four hours, and in the intervals drink enemas are given according to need. No liquid is given by the mouth. When the rectal feeding is sufficient, he states, the tongue is moist and the breath is sweet, while that of a starved patient is peculiarly offensive, somewhat like that of a drunkard. Moreover, the patient is comfortable when sufficiently fed. When the rectum is intolerant, he gives laudanum (5 to 10 min.) two or three times a day. Feeding by the mouth is carefully begun on the eleventh day.

G. Fuchs⁴, from a study of the action of *bismuth in gastric ulcer*, has established the fact that the drug not merely furnishes mechanical protection for the diseased part, but that it also exerts a specific influence. According to the author, it is decomposed by the mucus into an oxyhydrate, which penetrates into the granulation tissue, and acts as

¹ Mittheilungen Aus den Grenzgebieten, xii, No. 1, 1903.

² Therap. der Gegenwart, v, 286, 1903.

³ British Medical Jour., October 24, 1904.

⁴ Deut. med. Woch., April 2, 1903.

an excellent protection. Chalk and magnesia are not capable of being substituted for bismuth, as they lack the specific properties of the latter. Bismutose, an insoluble, tasteless bismuth-albumin compound is regarded by Fuchs as the most useful preparation of bismuth on account of its easy reducibility. H. Elsner¹ has also had excellent results from bismutose in the treatment of hyperacidity and gastric ulcer. Owing to its active astringent properties, however, he finds it liable to cause marked constipation.

K. Walko,² having obtained excellent results in the treatment of gastric hyperacidity with olive oil (100 to 300 c.c.), has applied the treatment in 9 cases of gastric ulcer. He claims that the oil inhibits acid secretion, protects the ulcer, relieves constipation, resists decomposition, and promotes nutrition. The oil is given in 15 c.c. doses which are rapidly increased to 25 c.c. doses, thrice daily. When the patient objects to the oil, it is given in emulsion through a tube. While the symptoms usually abate within a week, it is recommended to continue the treatment for three weeks.

INTESTINAL ATONY.—G. Curlo³ concludes from laboratory and clinical experiments that *physostigmin* exerts an excitant effect upon the intestinal muscles, which results in increased peristalsis, and that the drug is especially indicated in all forms of coprostasis due to intestinal atony, and is contraindicated in spastic conditions, acute and chronic intestinal catarrh, and mucomembranous colitis. On account of its action in imparting tone to the intestinal muscles, the author regards it as an excellent remedy in meteorism, and states that the maximum dose that can be given without symptoms of intolerance is from $\frac{1}{16}$ to $\frac{1}{10}$ grain (0.004 to 0.006 gram), but that the usual dose is one-half of this quantity. Myosis and salivation are said to mark the point of tolerance. The salicylate is regarded as the best salt, and the pill the best form of administration. L. Moskowicz⁴ also has found injections of physostigmin salicylate ($\frac{1}{60}$ to $\frac{1}{30}$ grain, 0.001 to 0.002 gram) very valuable in severe postoperative meteorism. He reports 5 cases illustrating the efficacy of the drug.

INTESTINAL OBSTRUCTION.—V. V. Stavsky⁵ concludes from a study of the literature and from the remarkable results obtained in 4 cases in his own experience that *atropin* is a most valuable drug in certain cases of *acute intestinal obstruction*, and deserves a trial in every case

¹ Arch. f. Verdauungskrankh., Bd. viii, Heft 6.

² Centralbl. f. inn. Med., November 8, 1902.

³ La Riforma Med., September 16, 1903.

⁴ Wien. klin. Woch., No. 22, 1903.

⁵ Medizin. Obozryenie, lix, No. 9, 1903.

in which for any reason operation is contraindicated. He injected subcutaneously $\frac{1}{20}$ grain (0.003 gram) of atropin, and followed this in two hours by half the dose.

DIARRHEA.—Kerley,¹ from his experience at the Babies' Hospital, New York, finds that the most important measure in the management of summer diarrhea is a *change of diet*. He believes that the carbohydrates, usually in the form of barley or rice gruel, plain or dextrinized, form the best available milk substitute. Half an ounce of the raw cereal to a pint of water is the usual strength; it should be cooked for three hours. The wine peptone and beef preparations on the market may be used as flavors. He states that egg-albumin, beef-juice, and animal broths are not safe substitutes for milk.

J. L. Morse² believes in returning to a milk-diet after a few days in cases of summer diarrhea in infants, and thinks that the results will be as good as from cereal preparations and broths, provided the milk be sufficiently diluted at the start. This, however, does not gainsay the undoubted value of temporarily omitting milk.

T. D. Parke³ reports 2 cases of acute ileocolitis in which he withheld all food but water 5 and 8 days respectively. He contends that the patients recover more quickly on water than on any food, but admits that much shorter periods of privation are sufficient, and, at times, necessary.

H. Starck⁴ has employed *bismutose* (an insoluble, tasteless bismuth albumin compound) in 37 cases in children, comprising cholera morbus (10 cases), chronic enteritis (6 cases), acute intestinal catarrh (17 cases), and gastric ulcer (4 cases). The usual dose was 10 grains (0.6 gram) in mucilage, hourly. The results are said to have been excellent.

Weill, Lumière, and Pehu⁵ have found *gelatin* highly efficacious in the treatment of infantile diarrhea. The gelatin should be the purest obtainable and should be sterilized before use. A 10 per cent. solution is made, and 10 c.c. of this, containing 1 gram of gelatin, is given in each bottle food. From 6 to 8 doses are given daily, and this amount may even be doubled. Only in cases of cholera infantum did the drug exercise no effect upon the stools.

MUCOUS COLITIS.—W. N. Clemm⁶ claims excellent results in the

¹ New York Med. Jour., June 6, 1903.

² American Medicine, May 2, 1903.

³ Jour. Amer. Med. Assoc., June 20, 1903.

⁴ Münch. med. Woch., November 25, 1902.

⁵ Lyon Médical, August 23, 1903.

⁶ Arch. f. Verdauungskrankh., Bd. ix, Heft 1.

treatment of mucous colitis from daily injections into the bowel of a solution of *albargin* (gelatose-silver nitrate). He administers in the evening an enema consisting of half a pint of water, in which are dissolved about 6 grains of albargin.

DYSENTERY.—W. T. Buchanan¹ states that he has notes of 1130 cases of dysentery treated in India by the sulphate of magnesium sodium, with only 9 deaths, and finds that there has not been a single death in the last 272 cases treated by him.

Kruse² presents a report demonstrating the efficacy of his serum in the treatment of dysentery. He states that $\frac{1}{80000}$ of a grain is sufficient to offset the lethal dose of dysentery bacilli in a guinea-pig. The author has treated 100 patients with this serum, and notwithstanding the fact that 3 of these were practically moribund when treatment was begun, and 19 were less than 10 years of age, there were but 8 deaths. He considers that the prophylactic use of the serum would give the best results.

F. H. Weisenburg³ has had excellent results from the use of water from an effervescent sulphur spring in tropical dysentery.

PRURITUS ANI.—S. Johns⁴ has used for many years with great success applications of *dry calomel in the treatment of pruritus ani*. He has the patient wipe the anus after each evacuation, dry it with absorbent cotton, and apply about 20 grains of calomel with the fingers.

DISEASES OF THE LIVER

GALL-STONE DISEASE.—D. D. Stewart⁵ holds that the treatment of uncomplicated gall-stone disease should be directed to allay inflammation of the gall-bladder. Any existing abnormality of the motor or secretory functions of the stomach should receive appropriate treatment. The food should be plain and easy of digestion. When there is gastric subacidity pancreatin may be given freely with meals. Gastric atony is best treated by daily morning douching of the stomach with alternate hot and cold water; weak sodium bicarbonate or Carlsbad salt in the hot water and sodium chlorid in the cold, the last being preferably a weak quassia or calumba infusion. In all cases sodium sulphate either alone or in one of the Carlsbad combinations should be given. This salt is administered in rather hot solution on rising, sub-

¹ British Med. Jour., September 20, 1902.

² Deut. med. Woch., January 1-15, 1903.

³ Phila. Med. Jour., March 14, 1903.

⁴ Therapeutic Gazette, May 15, 1903.

⁵ Amer. Jour. Med. Sciences, May, 1903.

sequent to the lavage, if this is practised. Movement and breathing exercises should be taken after its ingestion, and no food is permitted for upward of an hour afterward. If the bowels are sluggish and a tendency to looseness is not set up by the Glauber salt, a similar combination in smaller doses is given before lunch and dinner, and on going to bed if food is not then taken. If hyperchlorhydria exists, sodium bicarbonate is omitted from the early morning combination, and a full dose (40 to 60 grains, 2 to 4 grams) given either alone or in combination with a small quantity of Glauber salt or sodium phosphate 3 to 4 hours after the preceding meal and not later than one-half hour before the following one. The fluid extract of taraxacum (1 to 2 drams, 4 to 8 c.c.) is coincidentally administered. Whatever the condition of the motor or secretory function of the stomach, notably good results are often obtained by the daily morning use of sodium bicarbonate solution through the stomach-tube. Abundant outdoor exercise, except in cases of very recent active symptoms, is insisted upon. If the trouble recurs, despite carefully carried out treatment and the patient is well-to-do and disinclined for operation, a sojourn at Carlsbad is advised.

W. J. Mayo,¹ in discussing the causes of the occasional failure of operation to cure gall-stone disease, states that the death-rate, taking the cases as they come, is hardly more than 5 per cent., and in uncomplicated cases less than 2 per cent. In 631 operations on the gall-bladder only 3 per cent. required a secondary operation.

ACUTE CHOLECYSTITIS.—J. H. Musser,² from a study of 116 cases of acute cholecystitis, 48 of which had followed typhoid fever, concludes that the best treatment is to operate early and to remove the gall-bladder. Forty per cent. of his patients died without operation, and only 5 per cent. after operation.

¹ Journal of the American Medical Association, December 26, 1903.

² New York Medical Journal, November 7, 1903.

INDEX TO VOLUME I

(FOURTEENTH SERIES)

A

Abdominal conditions and acute thoracic disease, 208
Acetanilid poisoning, 202
Acetozone in typhoid fever, 267
Acholia, 216
Aconite in uremia, 289
Acromegaly, metabolism in, 200
Adams-Stokes syndrome, 206
Addison's disease, suprarenal extract in, 283
 organotherapy in, 283
Adonidin, physiologic action of, 18
 in disease of the heart, 13, 16, 17
 in nephritis, 15
Agorin, 287, 291
Albargin in mucous colitis, 296
Albuminuria, alimentary, 219
 and aortic regurgitation, 207
 and chlorid retention, 9
 and concentration of the urine, 218
 and milk, 11
 and proteid food, 11
 and salicylates, 219
 and trauma, 219
 cyclic, 218
 in erysipelas, 220
 orthostatic, 219
 without casts, 221
Alcohol, effect of, on bacteriolytic action of the blood, 267
 in typhoid fever, 266
Alkalinity of the blood, 201
Ampulla of Vater, stone in, 130
Anemia, bothrioccephalus, 203
 cryptogenic, 203
 obscure, 201
 pernicious, 203
 splenic, splenectomy in, 282
Anesthesia, 228
Anesthesin in erysipelas, 272
Aneurism aortic, diagnosis of, 208
Angina, Ludwig's, and typhoid fever, 289
Angioma, 88
Angiosarcoma, 240
Anions, 51
Anorexia, 292
Antidiphtheritic serum, 269
 in bronchopneumonia, 292
Antidysentery serum, 296
Antiplague serum, 275
Antipneumococcic serum, 272

Antiscarlatinal serum, 269
Antistreptococcic serum in erysipelas, 272
 in malignant endocarditis, 285
 in tuberculosis, 277
Antitetanic serum, 274
Antitoxin, Dunbar's, in hay fever, 291
 golden rod, in hay fever, 291
Antituberculosis serum, 277
Antityphoid inoculations, 267
Aortic aneurism, 208
 regurgitation and albuminuria, 207
Apocynum cannabinum as a diuretic, 287
Appendicitis, 126
 and acute thoracic disease, 208
 and gangrene of the leg, 214
 and influenza, 214
 simulating tuberculous peritonitis, 214
Aristoquinin in whooping-cough, 272
Arrhythmia cardiac, 206
Arteries, action of adonidin on, 13
Arthritis deformans, 199
 and exophthalmic goiter, 200
 pneumococcic, 191
Ascites and liver cirrhosis, 216
 and obliterative pericarditis, 206
Aspirin in diabetes, 282
 in rheumatism, 279
Atropin in intestinal obstruction, 294

B

Bacilli, acid-fast, in sputum, 186
 tubercle, in sputum, 186
Bacteriology of the blood, 232
Barium chlorid in heart disease, 287
Baths, hot, in chronic rheumatism, 280
Beck, Carl, Angioma and its treatment, 88
Beer yeast in diabetes, 282
Bell's palsy, 167
Bile in the urine, Huppert's test for, 215
Biliary obstruction and hepatoptosis, 216
Bismutose in infantile diarrhea, 295
Blackwater fever, 193
Blood alkalinity, 201
 bacteriology of, 232
 cultures, 231
 examinations, diagnostic value of, 201
 in surgery, 280
freezing-point of, 50
pressure, 204, 226

Bromoform poisoning, 273
 Bronchi, blood casts of, 209
 Bronchopneumonia, counter-irritation in, 291
 diphtheria antitoxin in, 292
 Burns, 282
 Butter and typhoid infection, 188

C

Carbolic acid in smallpox, 270
 in tetanus, 270
 Carcinoma and pernicious anemia, 202
 basocellulare, 240
 of the stomach, 103, 253
 of the colon, 101, 103, 125
 Cardiac failure in anesthesia 284
 hypertrophy in renal disease, 220
 Cattell, Henry W., The practical application of cryoscopy to medicine, 50
 Cerebrospinal fluid, freezing-point of, 61
 Cervicitis, treatment of, 146
 Chlorid reduction treatment of parenchymatous nephritis, 1
 Chlorosis, 202
 Cholecystitis, post-typhoidal, 297
 Cholecystotomy, 123
 Cholelithiasis, 216
 and leukocytosis, 217
 Cholemia, 215
 Chyluria, 218
 Cirrhosis of the liver and ascites, 216
 Clark, John G., and Luther, John W., A critical review of methods of intestinal anastomosis with especial reference to the Connell suture, 98
 Colitis, mucosa, albargin in, 296
 Collapse, 226
 Collargol, therapeutic applications of, 18
 Colon, carcinoma of, 101, 102, 103, 125
 Connell suture, 98, 113
 Cough, importance of, 209
 Craig, Daniel H., The non-operative treatment of chronic ovarian lesions, 153
 Creasote carbonate in pneumonia, 272
 Crede's ointment, 19
 Cryoscopic apparatus, 53
 Cryoscopy, 50
 and specific gravity of the urine, 59
 in diabetes, 60
 in drowned subjects, 37
 in epilepsy, 60
 in meningitis, 61
 in pneumonia, 61
 in renal diseases, 55
 in typhoid fever, 61
 medico-legal aspects of, 57, 64
 urinary, 221
 Cyanosis, chronic, and polycythemia, 201
 Cystectomy, 128, 129, 140
 Cystotomy, 124
 Cytodiagnosis, 202

D

Davenport, Francis H., The non-operative treatment of inflammations of the genital tract, 141
 Davis, Nathan Smith, The increased prevalence and mortality of pneumonia during the past sixty years, with reference to its prevention and treatment, 41
 Diabetes mellitus, acid intoxication in, 198
 treatment of, 281
 insipidus, metabolism in, 198
 Diarrhea, infantile, diet in, 295
 treatment of, 295
 Diazo reaction, 188
 Dionin in whooping-cough, 272
 Diphtheria, antitoxin treatment of, 269
 Drowning, cryoscopy in, 57
 Duodenal perforation, 250
 Dysentery, 214
 magnesium sulphate in, 296
 serum treatment of, 296

E

Edema and chlorid retention, 9
 Edes, Robert T., What is the cure for neurasthenia? 26
 Edsall, David L., Progress of medicine during 1903, 182
 Electricity in gastric neurasthenia, 36
 in angioma, 91
 Electrolytes 51
 Electrons, 51
 Emphysema of the lungs, etiology of, 209
 Endocarditis, acute, 207
 salicylates in, 284
 malignant, antistreptococcic serum in, 285
 Endocervicitis, treatment of, 146
 Erysipelas and albuminuria, 220
 treatment of, 271
 Esophageal and gastric diseases, 210
 stricture, theosinamin in, 292
 Euquinin in malaria, 274
 Excretions, freezing-point of, 55
 Exophthalmic goiter, goat's milk in, 284
 and rheumatoid arthritis in, 200
 sodium sulphaniolate in, 284
 Extra-systole, 205
 Exudates, freezing-point of, 52

F

Facial paralysis, 167
 Favill, Henry Baird, Nephritis of gastrointestinal origin, 65
 Feces, examination of, 213
 Fever, blackwater, 193
 Malta, 194
 paratyphoid, 189
 scarlet, 269
 trypanosoma, 194

Fever, typhoid, 187, 266
typhus, 195

Fibroma of the skin, 241

Fibrosarcoma, 289

Flies and typhoid infection, 187

Fluoroform in whooping-cough, 278

Formaldehyd in tuberculosis, 277
in whooping-cough, 278

Fractures, 233

Freezing-point of blood, 50
of cerebrospinal fluid, 61
of excretions, 55
of exudates, 52
of fluids, 50
of gastric juice, 62
of milk, 52
of saliva, 62
of secretions, 55
of transudates, 52
of urine, 50

G

Gall-stones, 123, 128, 130, 296

Gaston, J. McFadden, Complications met
in the surgical treatment of diseases of
the testicle, 116

Gastrectomy, methods of, 256

Gastric and esophageal disease, 210

and spinal disease, 211
disease and infusoria, 210
hemorrhage, 247

after laparotomy, 249
hyperacidity, olive oil in, 294
juice, freezing-point of, 62
of pigs in stomach disorders,
292

perforation, 250
neurosis, treatment of, 257
surgery, 123, 131, 243
ulcer, 212, 243, 293

Gastro-enterostomy and enterostomy, 126

Gastrocele, 212

Gastro-intestinal origin of nephritis, 65

Gastrosuccorhea, 293

Gelatin in pulmonary hemorrhage, 278
tetanus following injections of, 279

Genital tract, non-operative treatment of
inflammations of, 141

Gerhardt's change of note, 75

Glycolytic ferments, 197

in the pancreas, 197

Glycosuria, 196

Glycuronic acid, 198

Golter, exophthalmic, 199, 284

Gonorrhea in the female, 143

Gout, frequency of, in the United States,
281

necrotic areas in, 199
treatment of, 281

Griffith, Frederick, A new surgical mal-
let, 136

Gualacol inunctions in smallpox, 271

H

Haffkine's serum in plague, 275

Halsted's suture, 107

Hay fever, Dunbar's antitoxin in, 291
golden rod antitoxin in, 291

Heart, action of adonidin on, 13
disease and syphilis, 205

exercise in, 286

barium chlorid in, 287

Nauheim treatment in, 285

Hellebore, 18

Helmitol in typhoid bacilluria, 268

Hemangiosarcoma, 240

Hemisyctole, 205

Hemocryoscopy, 63

Hemoglobinuria, malarial, 193

and uncinariasis, 193

Hemophilia, thyroid extract in, 283

Hepatic drainage, 130

Hepatoptosis and biliary obstruction,
216

Hernia, inguinal, 116

Bassini-Halsted method of cure,
122

Hodgkin's disease, x-rays in, 282

Hot baths in chronic rheumatism, 280

Hydrocele, 116

Hydrotherapy in gastric neurasthenia, 38

Hypersthenuria, 63

Hyposthenuria, 63

I

Ichthyol in smallpox, 271

Icterus, slow pulse in, 215

Iodin reaction of leukocytes, 202

Ions, 51

Infarct of the lungs, 209

Inflammations of the genital tract, non-
operative treatment of, 141

Influenza and appendicitis, 214

and typhoid fever, 189

Influenzal neuritis, 169

Infusoria and gastric diseases, 210

Intercostal neuritis, 172

Intestinal anastomosis, 98

antiseptics in typhoid fever, 267

forceps, 114

perforation in typhoid fever, 268

surgery, 123, 243

Intestine, multiple stenosis of, 214

Intoxication of liver disease, 215

J

Javal, A., and Widal, F., The chlorid re-
duction treatment of parenchymatous
nephritis, 1

Jejunum, peptic ulcer of, 255

K

Kations, 51

Kidneys, action of adonidin on, 14

chlorid reduction treatment of pa-
renchymatous inflammation of, 1

L

- Lavage in gastric neurasthenia, 86
 Lambert suture, 106
 Leukamemia, 208
 Leukemia, acute myelogenic, 204
 Leukocyte count in surgery, 231
 in abdominal lesions, 231
 in appendicitis, 213
 in typhoid perforation, 231
 iodin reaction of, 202
 Levulosuria, 196
 and disease of the liver, 215
 Lipoma of the skin, 242
 Litten's sign in pulmonary tuberculosis, 78
 Liver cirrhosis, 216
 and ascites, 216
 surgery, 123
 Ludwig's angina and typhoid fever, 189
 Lung apices, examination of, 186
 emphysema of, 209
 infarct of, 209
 syphilis of, 209
 Luther, John W., and Clark, John G., A critical review of methods of intestinal anastomosis, with especial reference to the Connell suture, 98
 Lymphangiosarcoma, 238

M

- Malaria and mosquitoes, 192
 diagnosis of, 193
 euquinin in, 274
 methylene blue in, 274
 mononuclear leukocytes in, 193
 quinin as a prophylactic in, 274
 hypodermically in, 274
 Malarial hemoglobinuria, 193
 Mallet, new surgical, 136
 Malta fever, 194
 Mastodynia, 174
 McCaskey, George W., The treatment of gastric neurasthenia and allied conditions, 34
 Measles, disinfecting inhalations in, 269
 Mesotan in rheumatism, 279
 Metabolism, diseases of, 196
 in acromegaly, 200
 in diabetes insipidus, 198
 mellitus, 197
 in gout, 281
 in nephritis, 222
 Methylene blue in malaria, 274
 in tuberculosis, 278
 Micrococcus of rheumatism, 191
 Milk and albuminuria, 11
 freezing-point of, 52, 62
 Moles, congenital, 238
 Morphine in uremia, 289
 Moser's serum in scarlatina, 269
 Mosquitoes and malaria, 192
 Murphy button, 114
 Myopathic spinal rigidity, 200

N

- Nævus, congenital, 240
 Nauhelm treatment of heart disease, 285
 Nephritis, acute, ice locally in, 238
 chronic, diet in, 290
 diagnosis of, 221
 of gastrointestinal origin, 65
 metabolism in, 222
 parenchymatous, chlorid reduction treatment of, 1
 phloridzin test in, 68, 221
 toxic, 65
 Netter and Salomon, Drs., The therapeutic applications of colloid silver, 18
 Neurasthenia and hysteria, 26
 cure of, 26
 gastric, 35
 rest treatment of, 29
 Neuritis, brachial, 179
 facial, 167
 influenzal, 169
 intercostal, 172
 peripheral, 166
 pressure, 166
 rheumatic, 167
 sciatic, 169
 Neurofibroma, 241
 Noble, Charles P., Observations upon gastric, intestinal, and liver surgery, 123

O

- Obstipation, spastic, 213
 Ovarian lesions, chronic, non-operative treatment of, 153

P

- Pancreas, surgery of, 257
 Pancreatic abscess, 264
 Pancreatitis, acute, 258
 chronic, 264
 Paralysis, facial, 167
 Parasitic diseases, 195
 Paratyphoid fever, 189
 Pelvic examination, 157, 162
 in young girls, 165
 organs, reposition of, 157
 Pelvic and respiratory diseases, relation between, 156
 Pentosuria, 196
 Pericarditis, obliterative, and ascites, 206
 Peritonitis, pelvic treatment of, 151
 Pernicious anemia and carcinoma, 202
 etiology of, 208
 toxemia in, 203
 Pertussis, 272
 Phosphaturia, 217
 Physostigmin in intestinal atony, 294
 Pilocarpin in scarlet fever, 269
 Plague, Haffkine's serum in, 275
 Yersin's serum in, 276
 Pleurisy and appendicitis, 208

Pneumococcic arthritis, 191
 infection, 191
 septicemia, 190

Pneumonia and appendicitis, 208
 antiphlogistic treatment of, 46
 bacteriology of, 42, 190
 bleeding in, 46
 creasote carbonate in, 272
 femoral thrombosis in, 190
 increasing mortality of, 42
 increasing prevalence of, 41, 190
 physical signs of, 190
 serum treatment of, 272
 treatment of, 45

Poisoning, acetanilid, 202
 bromoform, 273

Polyarthritis and tuberculosis, 200

Polycythemia and chronic cyanosis, 201

Post-anesthetic complications, 230

Potassium permanganate, in erysipelas, 271

Pritchard, William Broadus, Peripheral neuritis, 166

Progress of medicine, 182
 of surgery, 223
 of treatment, 266

Pruritus ani, calomel in, 296

Pseudo-hemisystole, 205

Pulmonary tuberculosis, early diagnosis of, 75

Pulse frequency in pulmonary tuberculosis, 79
 slow, in icterus, 215

Pyosalpinx, 104

Q

Quinin as a prophylactic in malaria, 274
 hypodermically in malaria, 274
 salicylate in rheumatism, 279

R

Records of surgical clinics, 223

Rectal enemas, 213
 nutritive value of, 213

Red-light treatment of erysipelas, 271
 of smallpox, 271

Reflexes in nephritis, 220

Renal disease, cryoscopy in, 55
 cardiac hypertrophy in, 220

Respiratory failure in anesthesia, 284

Respiratory and pelvic diseases, relation between, 156

Rheumatism, aspirin in, 279
 hot baths in chronic, 280
 mesotan in, 279
 micrococcus of, 191
 quinin salicylate in, 279
 serum treatment of, 192
 streptococcus of, 191

Rocky Mountain fever, 196

Röntgen rays in pulmonary tuberculosis, 78
 in fractures, 233

Roux's operation for vomiting, 131

S

Salicylates and renal irritation, 219
 in acute endocarditis, 284

Saliva, freezing-point of, 62

Salomon and Netter, Drs., The therapeutic applications of colloid silver, 18

Salpingitis, treatment of, 149

Sanatorium treatment of tuberculosis, 176

Sarcoma of the skin, 238
 of skin scars, 241

Scalds, 232

Scarlet fever, antiscarlatinal serum in, 269
 disinfecting inhalations in, 269
 Moser's serum in, 269
 pilocarpin in, 269

Sciatica, 169

Secretions, freezing-point of, 55

Septicemia, 195
 pneumococcic, 190

Serositis, multiple, 206

Serum treatment of bronchopneumonia, 292
 of diphtheria, 269
 of dysentery, 296
 of endocarditis, 285
 of erysipelas, 272
 of hay fever, 291
 of plague, 275
 of rheumatism, 192
 of scarlatina, 269
 of tetanus, 274
 of tuberculosis, 277
 of typhoid fever, 267

Shingles, 173

Shock, 226

Silver, colloid, therapeutic applications of, 18

Sleeping sickness, 194

Smallpox, carbolic acid in, 270
 gualacol inunctions in, 271
 ichthyol in, 271
 red-light treatment of, 271

Sodium cinnamate in tuberculosis, 278
 glycocholate in diabetes, 282

Spinal and gastric diseases, 211
 rigidity, myopathic, 200

Spleen, puncture of, in diagnosis of typhoid fever, 188

Splenic anemia, splenomegaly in, 282
 enlargement, chronic cyanosis and polycythemia, 201

Sputum, tubercle bacilli and acid-fast bacilli in, 186

Stomach, carcinoma of, 103, 243, 253
 dilatation of, 211
 hemorrhagic erosion of, 211
 hour-glass, 211
 multiple cicatrices of, 126
 surgery, 243
 ulcer, 243

Stomatitis, mercurial, 292
 ulcerative, 210
 Streptococcus of rheumatism, 191
 Surgical clinics, records of, 223
 infections, 227
 literature, 225
 Suprarenal extract in Addison's disease, 283
 Suture, Connell, 98, 113
 Halsted, 107
 Lembert, 106
 Syphilis in heart disease, 205
 of the lung, 209

T

Tampon, vaginal, 150, 158
 Temperature changes in tuberculosis, 79
 Testicle, diseases of, 116
 Tetanus, carbolic acid in, 274
 serum treatment of, 275
 Theocin, 287, 291
 Thiochol in tuberculosis, 278
 Thiosinamin in esophageal stricture, 292
 Thyroid extract in hemophilia, 283
 Tic douloureux, 174
 Tonsils and tuberculosis, 184
 Toxin of typhoid bacilli, 267
 Transudates, freezing-point of, 52
 Trauma and pericarditis, endocarditis and myocarditis, 107
 Treatment, chlorid reduction, of parenchymatous nephritis, 1
 Trypanosomiasis, 194
 Tubercle bacilli, passage of, through intestinal mucous membrane, 183
 Tuberculin, 185
 Tuberculosis and apical murmur, 208
 and Hodgkin's disease, 184
 and loss of mineral substances, 184
 and polyarthritis, 200
 and tonsils, 184
 antistreptococcal serum in, 277
 contagion in, 85
 diagnosis of, 75, 185
 formaldehyd in, 277
 gelatin in hemorrhages of, 278
 inoculation of, 182
 methylene blue in, 278
 mode of infection in, 182
 physical signs of, 76
 pulse frequency in, 79
 prognosis of, 186
 sodium cinnamate in, 278
 thiochol in, 278
 toxin, 277
 sanatorium treatment of, 276
 weight chart in, 186
 somotherapy in, 277

 Tubo-ovarian abscess, 104
 Tumors, benign, 284
 malignant, 286
 Typhoid bacilluria, 268
 bacilli, specific toxin of, 267
 fever and acute miliary tuberculosis, 188
 and Ludwig's angina, 195
 and protozoa, 195
 Widal reaction in, 188

U

Uncinariasis, 195
 and malarial hemoglobinuria, 193
 Uremia, aconite in, 289
 morphin in, 289
 saline infusion in, 289
 Urinary cryoscopy, 63, 221
 pigment, amount of, 217
 Urine and glycuronic acid, 198
 freezing-point of, 50
 specific gravity of and cryoscopy, 59
 Urinocryoscopy, 63
 Urobilinuria, 215
 Urotropin in typhoid bacilluria, 268

V

Vaginitis, treatment of, 145
 Varicocele, 116
 Variola, 192, 270
 organism of, 192
 Vater, ampulla of, stone in, 130
 Vomiting, Roux's operation for, 131
 Vulvitis, treatment of, 143

W

Walsh, James J., The early diagnosis of pulmonary tuberculosis, 75
 Whooping-cough, treatment of, 273
 Widal, F., and Javal, A., The chlorid reduction treatment of parenchymatous nephritis, 1
 Widal reaction, 188
 Wilcox, Reynold Webb, Adonidin: A clinical study, 13
 Wintrich's change of note, 75

Y

Yersin's serum in plague, 276

Z

Zomotherapy in tuberculosis, 277
 Zoster, 173

UNIVERSITY OF MICHIGAN



3 9015 07037 0757

UNIV. OF MICHIGAN
JAN 6 1910

